

APPENDICES

APPENDIX #1

Castle Creek Subwatershed

Castle Creek is a perennial stream that drains approximately 129,542 acres and generally flows in a northeasterly direction. The fourth order creek begins at close to 6,700 feet near Toy Mountain pass. Catherine, Browns, Bates, Hart and Pickett Creeks all flow into Castle Creek. After the creek exits the Owyhee front it flows through rangeland and pastures before emptying into the Snake River around 2,400 feet.

The 13-mile listed portion is a Rosgen C channel, a sediment depositing reach characterized by a U-shaped, sandy channel bottom. In swifter parts of the stream, the substrate is made up of partially embedded cobbles. This creek exhibits entrenchment and unstable banks in portions of the lower watershed. A large portion of the stream channel entrenchment is due to flash flood rain events, or rain on snow flood events. A small portion of the entrenchment problem can also be attributable to stream channel straightening. Where the riparian area has not been disturbed or the channel is not deeply entrenched, the riparian area is thick with a variety of willows, sedges and rushes.

There are geothermal sources of water in the Castle Creek sub-watershed. Some of the warm water enters the creek due to the presence of flowing wells, while the common use of warm water for irrigation purposes, accounts for much of the warm water returning to the creek. Before the hot water wells were drilled and used for irrigation, a hot water spring at the mouth of the canyon fed Castle Creek throughout the year. The Castle Creek watershed has been settled for over 100 years and irrigation development can be traced back to the 1880s, although the greatest amount of irrigation development occurred in the 1950s and 1960s. Mining also occurred historically in the watershed.

Land Ownership and Land Use

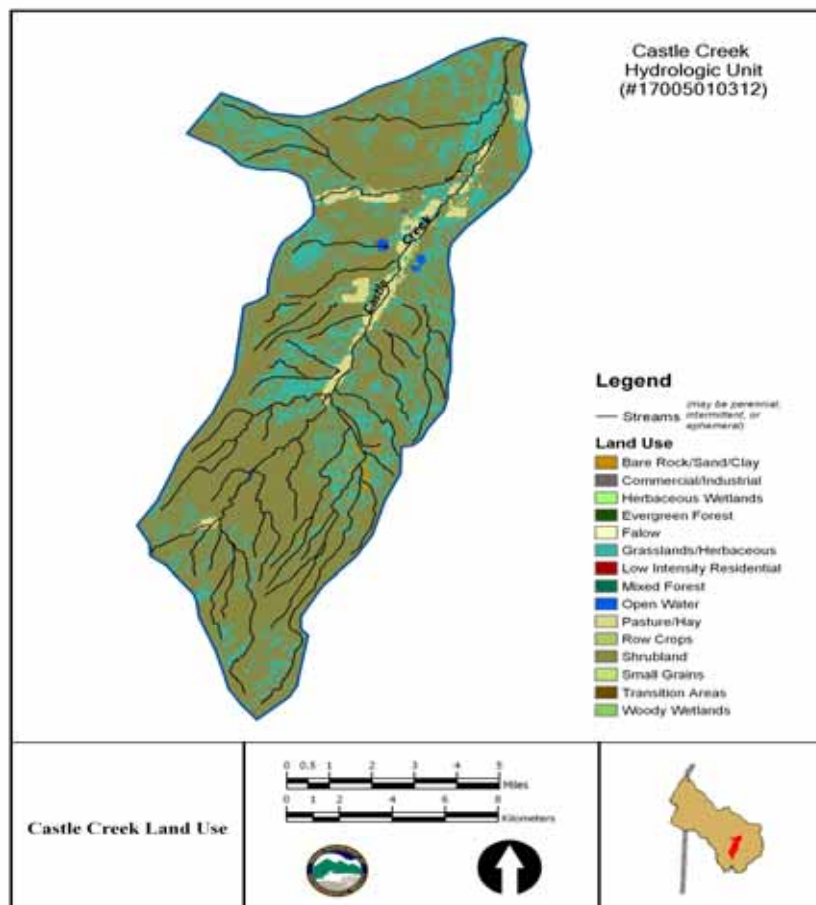
The upper part of the Castle Creek watershed is primarily rangeland, while the lower reaches below the canyon are a mix of irrigated agriculture and rangeland. Deposits of bentonite are also actively mined within the watershed. Also, parts of the watershed are considered to have high mineral potential and sedimentary rock alongside the creek which is being mined for industrial minerals (BLM 1999). Figure 1 shows the land use patterns within the watershed. While private lands exist in the upper part of the watershed, land is primarily BLM owned. The private lands along Castle Creek below the mouth of the canyon are a mix of rangeland and irrigated cropland. The crops farmed on the irrigated cropland along Castle Creek consists primarily of alfalfa hay, corn, grain and permanent pasture. The agricultural fields are surface (flood) irrigated as well as sprinkler

irrigated throughout the growing season (see Table 1). The farmers use irrigation water from the creek in the spring and early summer when sufficient runoff is available. When the runoff water subsides, water is pumped from deep hot water wells to finish the growing season. The hot water wells water temperatures ranges from 140 degrees to over 180 degrees F. The water has to be pumped into open ponds and cooled before it can be used for irrigation, due to these high temperatures. The excess irrigation water applied to the agricultural fields along the creek flows back into the creek itself. This agricultural return water is what determines the stream flow throughout most of the growing season in Castle Creek, except during the spring snow melt. The hay, grain and corn raised along Castle Creek are used primarily as winter feed by the local cattle ranchers for their livestock.

Table 1 - Irrigated cropland – Castle Creek

Type of Irrigation	Acres	Percent
Surface irrigation	1546.9 Acres	49.7%
Sprinkler irrigation	1564.6 Acres	50.3%

Figure 1. Castle Creek Land Use



Private Land Riparian Resource Concerns

There was no evidence of “excessive” stream bank erosion or deposition caused by poor upland conditions. This determination does not imply absence of problems in the uplands, but that there is no evidence that upland problems are directly impacting stream function. Regarding the TMDL objectives for the streams assessed in 2003, the primary focus for BMP implementation will be on the riparian areas themselves and the management of irrigation diversions.

Riparian/wetland vegetation

Most of the reaches assessed on Castle Creek were found without adequate stabilizing vegetative species. Regeneration of riparian species is limited throughout most of the stream reaches assessed, due to a lack of water and/or grazing impacts. Water seems to be adequate within the shallow aquifer for maintenance of riparian vegetation. Most reaches did, however, contain stabilizing species, such as black willow, common three square, and bulrush near the Snake River. It is also noted that alkali soils are found through much of the riparian and adjacent lands. This alkali may limit vegetation to what is tolerant to salts. Salt cedar was also found in the reaches near the mouth.

Depending on the characteristic of a storm event, stream bank erosion may occur even with adequate vegetation, as demonstrated by the summer cloud burst in 2003. Stabilizing vegetation is very influential on channel shape. Vegetation can decrease channel bankfull widths, creating trapezoid-shaped channels, and ultimately increasing floodplains inwardly. Narrowing channel width (bankfull width) may help reduce fine material when higher flows occur.

Most of these stream reaches are capable and do support woody species (trees and shrubs), but at different quantities. Riparian woody species are restricted by water availability, elevation to surface, soil type, and availability of parent stock.

Lateral Stream Bank Erosion – Floodplain Development

No reaches along Castle Creek were found to have active and excessive lateral stream bank erosion with an outward development of its floodplain. Limited annual flow and infrequent storm events have resulted in little stream bank erosion and outward development of needed floodplain. There was a very short section in CC19 that had some bank erosion, but it did not represent the condition of the reach, which had a wide floodplain and fairly stable stream banks.

There is adequate floodplain (outward development) on most of the reaches. Inward floodplain development is still needed on all reaches, where channels are dish-shaped and over widened. The inward floodplain development would decrease the appearance of ‘dish-shaped’ channels and increase trapezoid-

shaped channels. If channel widths are decreased, average bank full depths should increase accordingly.

Excessive Deposition – Channel Substrate Conditions

Although no examples of excessive stream bank erosion was present along Castle Creek, there was a fairly high amount of fine materials within many of its reaches. Flow alterations, nominal bank erosion, and some sedimentation from irrigation return flows are likely the “active” source of the fine materials. The low gradient portions of the stream downstream of the active diversions are likely to have the greatest quantity of fine materials. Infrequent storm events also cause the accumulation of fines as stream flows are not adequate to scour the channel. A lack of moderate to high flows may be the greatest limitation to “cleaner” substrates within the riparian zone along Castle Creek.

Bank erosion is assumed by DEQ (2003) to be the source or cause of excessive fines. DEQ (appendix H) rated lateral recession rates no higher than moderate (0.11), which is derived from the NRCS Stream Bank Erosion Inventory. The moderate erosion category ranges from 0.06 to 0.15. The TMDL calls for a 34.2% reduction in annual bank erosion to reduce the percentage of fine materials in the channel. Higher stream banks along Castle Creek also increases the estimated quantity of erosion per mile. Though rated only slight to moderate in bank erosion, high banks produced a greater portion of fines within the channel. **Based on this 2003 riparian assessment, active bank erosion does not seem to be the primary cause of the fine material within the Channel. Limited flows, channel shape, and low stream gradients seem to be the primary cause of excessive fines in Castle Creek.** The average gradient is about 0.7% (range 0.2 to 1.8%). In general, lower gradient streams usually consist of smaller sized materials within the channel.

Channel Down-cutting

No active head cuts were found within any of the reaches assessed in Castle Creek. Even though there are a few beaver dams in the upper part of the stream that are not being maintained, due to their very low profile, they have little effect on stream flow. In contrast, those beaver dams found in the lower portion of the channel, near the Snake River, were active and stable (Table 2).

Table 2. Various Riparian Attributes						
Stream Reach	Beaver Dams?	Beaver Dams Stable?	Excessive Bank Erosion	Excessive Deposition?	Unstable Head Cuts	Floodplain developing outward?
Castle CreekCC1	NO	NO	NO	NO	NO	NO
Castle CreekCC2	NO	NO	NO	NO	NO	NO
Castle CreekCC3	NO	NO	NO	NO	NO	NO
Castle CreekCC4	NO	NO	NO	NO	NO	NO
Castle CreekCC5	NO	NO	NO	NO	NO	NO
Castle CreekCC6	NO	NO	NO	NO	NO	NO
Castle CreekCC7	NO	NO	NO	NO	NO	NO
Castle CreekCC8	NO	NO	NO	NO	NO	NO
Castle CreekCC9	NO	NO	NO	NO	NO	NO
Castle CreekCC10	NO	NO	NO	NO	NO	NO
Castle CreekCC11	NO	NO	NO	NO	NO	NO
Castle CreekCC12	NO	NO	NO	NO	NO	NO
Castle CreekCC13	NO	NO	NO	NO	NO	NO
Castle CreekCC14	NO	NO	NO	NO	NO	NO
Castle CreekCC15	NO	NO	NO	NO	NO	NO
Castle CreekCC16	NO	NO	NO	NO	NO	NO
Castle CreekCC17	NO	NO	NO	NO	NO	NO
Castle CreekCC18	NO	NO	NO	NO	NO	NO
Castle CreekCC19	NO	NO	NO	NO	NO	NO
Castle CreekCC20	NO	NO	NO	NO	NO	NO
Castle CreekCC21	NO	NO	NO	NO	NO	NO
Castle CreekCC22	YES	NO	NO	NO	NO	NO
Castle CreekCC23	YES	NO	NO	NO	NO	NO
Castle CreekCC24	NO	NO	NO	NO	NO	NO
Castle CreekCC25	NO	NO	NO	NO	NO	NO
Castle CreekCC26	NO	NO	NO	NO	NO	NO
Castle CreekCC27	NO	NO	NO	NO	NO	NO
Castle CreekCC28	NO	NO	NO	NO	NO	NO
Castle CreekCC29	NO	NO	NO	NO	NO	NO
Castle CreekCC30	NO	NO	NO	NO	NO	NO
Castle CreekCC31	NO	NO	NO	NO	NO	NO
Castle CreekCC32	NO	NO	NO	NO	NO	NO
Castle CreekCC33	NO	NO	NO	NO	NO	NO
Castle CreekCC34	NO	NO	NO	NO	NO	NO
Castle CreekCC35	NO	NO	NO	NO	NO	NO
Castle CreekCC36	NO	NO	NO	NO	NO	NO
Castle CreekCC37	NO	NO	NO	NO	NO	NO
Castle CreekCC38	NO	NO	NO	NO	NO	NO
Castle CreekCC39	NO	NO	NO	NO	NO	NO
Castle CreekCC40	YES	YES	NO	NO	NO	NO
Castle CreekCC41	NO	NO	NO	NO	NO	NO
Castle CreekCC42	NO	NO	NO	NO	NO	NO
Castle CreekCC43	YES	NO	NO	NO	NO	NO

Land Ownership

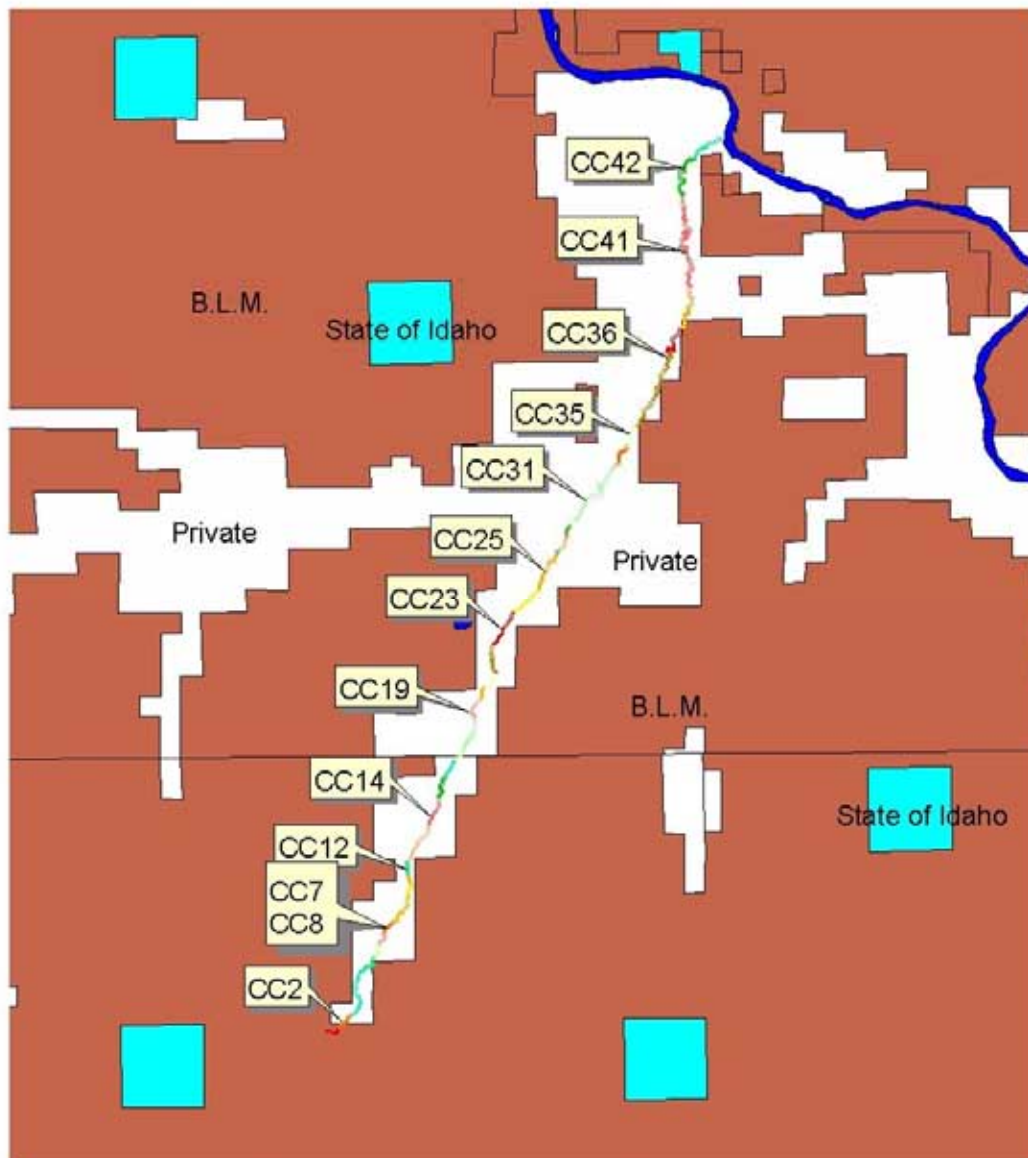


Figure 2 Castle Creek Ownership

Private Land Riparian Improvement Recommendations

The result of the 2003 stream inventory conducted by ISCC & IASCD, along with the interpretation of the data collected indicates that there are areas of Castle Creek in need of improvement (primarily riparian vegetation). Conservation plans should be developed with landowners to improve and maintain riparian conditions. The stream's current "state of succession or transition" will dictate how effective a BMP will be to improve given conditions (see Figure 3, Winward, 2000). A recently down-cut stream will generally respond slowly to grazing management adjustments while still increasing its' floodplain in an outwardly direction. In comparison, a stream with a well-developed floodplain may respond very well to a given change in grazing practices. Each stream reach, in many cases, each pasture, needs to be evaluated on its own merits. What works well in one area may not work at all in another.

There are two actions that could be implemented to improve riparian conditions: offsite water facilities and a reduction in grazing duration. These two actions are certain to provide some level of improvement and protection of the existing riparian areas. However, with limited annual flows throughout most of the stream channel, success of riparian improvements and channel conditions (substrate) may be limited.

The riparian areas in need of grazing management adjustments could be accomplished with or without the use of structural components such as fencing. Additional water developments and pasture fencing could make it easier to control livestock distribution and grazing intensity along the stream.

To further improve stability and shading, the duration of grazing should be reduced. Watering facilities are needed and fencing may be needed to increase the number of pastures to increase rotation and decrease duration. The primary reason to reduce duration and adjust timing is to increase and protect riparian vegetation. Allowing new vegetation growth each year will create multiple age classes, which increases both the quantity and quality of stabilizers along the stream bank in order to ensure long-term bank stability.

Prioritization of Improvement Areas

Based on the assessments and the data collected, the author has prioritized which stream reaches that should be addressed and first. The typical criteria for the prioritization are as follows:

- 1) Reaches that have full outwardly developed floodplains, or where no excessive lateral streambank erosion is indicating active outward floodplain development,
- 2) Floodplains exist and are inundated with relatively frequent flood events (every 1-2 years),
- 3) A diverse community of riparian-wetland vegetative species exists,
- 4) Adequate soil moisture for riparian-wetland species to exist.

Table 5. Stream Reach Condition Summary

Stream Name	Adequate stabilizing vegetative species present	Excessive lateral streambank erosion	Active & unstable headcuts present	Floodplain development occurring	Rated at or near Proper Functioning Condition (PFC)	High potential for successful treatment	Low potential for successful treatment
	Stream Reaches						
Castle Creek	N/A	N/A	N/A	CC3-10 CC16-19 CC35-40	CC1-2 CC12,14,15 CC26,33 CC41,42	CC3-10 CC-13 CC16-19 CC-22,25 CC29-31 CC-35-40 CC43	CC11,21 CC27,28 CC32,34

Conclusions of Riparian Assessment

Based on the 16 mile stream assessment in 2003, active excessive stream bank erosion does not seem to be occurring. Some high banks exist with some sloughing occurring, but overall, these few areas of erosion do not represent the condition of the reach in which it was found.

Fine sediment material that covers the channel bottom seems to be the result of flow alterations, over-widened channels (also dish-shaped), low stream gradients, and infrequent storm events. Even with large cloud-bursts, such as the one recorded in the summer of 2003, stream bank erosion or channel scouring does not always occur.

Riparian vegetation is in need of improvement, regardless of existing channel conditions. Alkali soils may limit riparian areas to fewer species. Water availability does not seem to be a limiting factor for maintaining riparian species. Managing vegetation should help reduce the quantity of fine material in the channels, but success may be limited by low annual flow volume.

Example Description of Alternatives for Surface Irrigated Cropland (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP
Alternative #1
(\$575/acre)**

Irrigation Water Mgmt.
Land Leveling
Irrigated System
Gated Pipe
Tail Water Recovery System
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

**SITE SPECIFIC BMP
Alternative #2
(\$300/acre)**

Irrigation Water Mgmt.
Concrete Ditch
Filter Strip
PAM
Sediment Basin
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

Example Description of Alternatives for Surface Irrigated Pasture (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP
Alternative #3
(\$520/acre)**

Fencing
Planned Grazing System
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Heavy Use Protection
Livestock Watering Fac.
Irrigation Water Mgmt
Field Border Irr. System
Gated Pipe

**SITE SPECIFIC BMP
Alternative #4
(\$400/acre)**

Fencing
Planned Grazing System
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Irrigation Water Mgmt.
Livestock Watering Fac.
Field Border Irr. System

**SITE SPECIFIC BMP
Alternative #
(\$290/acre)**

Fencing
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Livestock Watering Fac.
Irrigation Water Mgmt.
Field Border Irr. System

Table 6. Estimated BMP Cost Summary of Treatment Alternatives for the Castle Creek Sub-watershed.

ALTERNATIVE		ACRES	Total Costs
Alternative 1	\$ 575 / AC	1,050.8	\$ 604,210
Alternative 2	\$ 300 / AC	1,050.8	\$ 315,240
Alternative 3	\$ 520 / AC	495.2	\$ 275,504
Alternative 4	\$ 400 / AC	495.2	\$ 198,080

Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.

Tasks for Privately Owned Parcels

Task 1: Develop conservation plans with private agricultural landowners.
Responsible

Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)

Timeline: Immediately

Task 2: Assist private agricultural landowners to implement conservation plan components.

Responsible

Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)

Timeline: Ongoing

Task 3: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.

Responsible

Agency: IASCD & ISCC (support from NRCS IDL, and BLM)

Timeline: Ongoing

Task 4: Install “reference reach” transects to define potential and capability of shading of stream channels.

Responsible

Agency: ISCC (support from IASCD, NRCS, IDL, and BLM)

Timeline: Summer of 2006

APPENDIX #2

Jump Creek Subwatershed

Jump Creek is a 25.6-mile long stream that drains a 170 square mile watershed. The elevation change in the watershed is 2,040 feet, with the elevation of the headwaters at 4,240 feet and mouth at 2,200 feet. The headwaters of Jump Creek are located just above the Sands Basin in the Owyhee Mountain Range. After flowing in a northeasterly direction through the Sands Basin, Jump Creek passes through a narrow canyon. The canyon reaches depths of 600 feet and is often less than a quarter mile across. The cliffs and natural arches that bind Jump Creek as it flows through the canyon are primarily of Miocene volcanic origin. After exiting the canyon, Jump Creek opens up into the low gradient Snake River Plain where it flows in a northerly direction to the Snake River.

The Sands Basin portion of Jump Creek does not have year round flow although perennial pools occur in some years. Flow occurs as a direct result of spring snowmelt or flash flooding from cloudbursts. The flashiness of the stream discourages the growth of a shrub community. Instead, the riparian community consists mostly of tall forbs and grasses. About 2 miles down the canyon, a series of springs originate along a one-quarter mile stretch of the creek, marking the beginning of the perennial section. Below the springs, the quantity of water gradually increases as the stream mixes with other springs and small intermittent tributaries. Near the end of the canyon the 60-foot Jump Creek Falls occur (Figure 1.10). These falls effectively isolate the upper segment of stream from the lower segment. As the stream enters the Snake River Plain it begins to mix with a series of agricultural drains and small tributaries until it enters the Snake River.

Land Ownership and Land Use

The primary land use within the publicly held portion is livestock grazing. Within the privately held portion the land uses are primarily agricultural related activities such as rangeland grazing and sprinkler and flood irrigated cropland. The land uses in this agricultural segment are being addressed for sediment (although it is not §303(d) listed for sediment). The agricultural practices being addressed in this Implementation Plan are irrigated grazing and irrigated cropland. Figure 1 shows the land use patterns within the Jump Creek watershed (DEQ 2002a). The irrigated crops raised along Jump creek consist of alfalfa hay, beans, corn, grains, sugar beets, onions, alfalfa seed, and various other seed crops (onion seed, carrot seed, sweet corn seed, clover seed, lettuce seed, radish seed and bean seed). The intensively row cropped area along Jump Creek is from Highway 95 downstream to the Snake River near Marsing, Idaho.

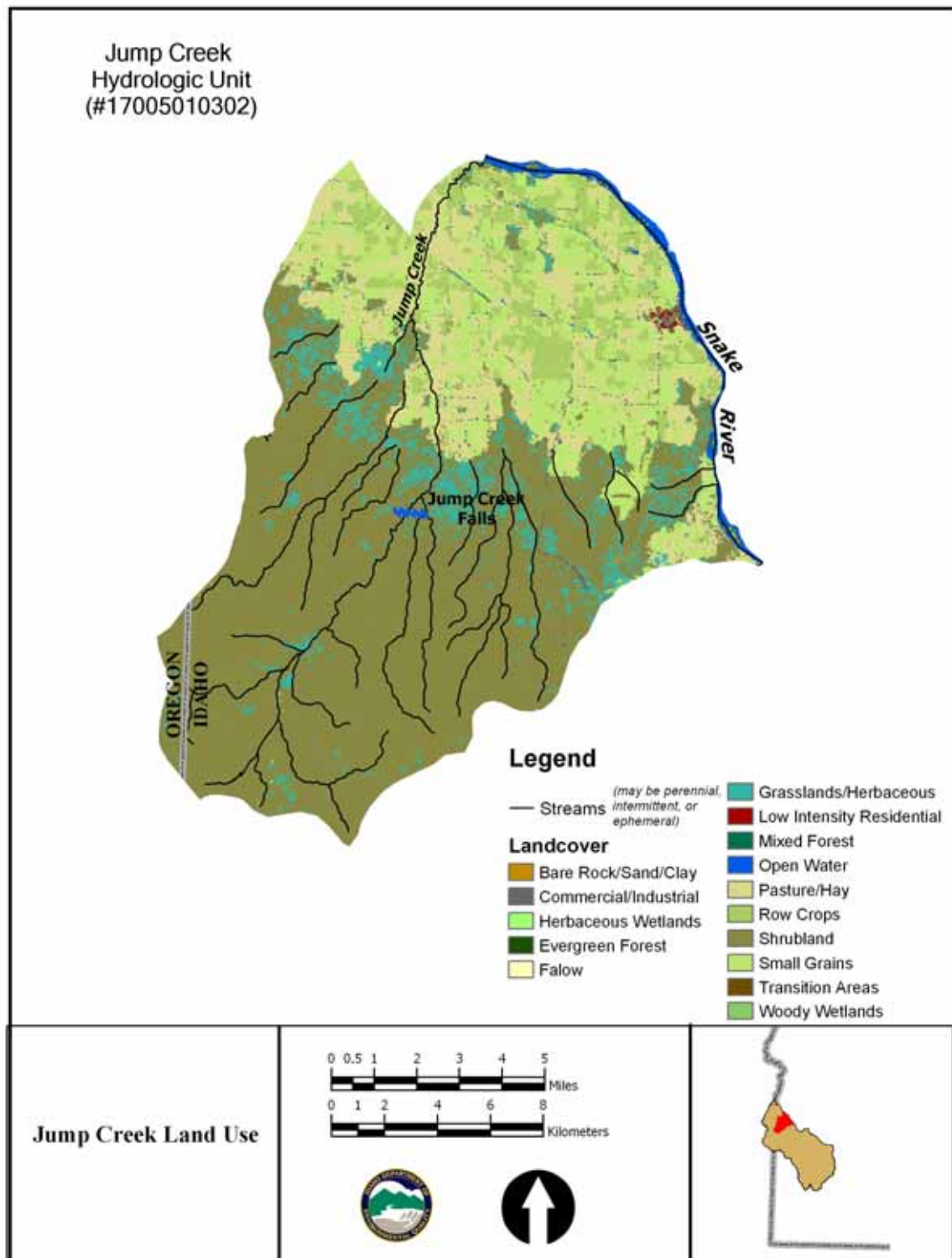


Figure 1. Jump Creek Land Use

Water Quality Issue

The water quality issue we are going to address in the segment of Jump Creek from the Mule Creek Drain to the Snake River is sediment. This segment of stream is primarily privately owned agricultural lands. There are two primary sources that are responsible for the sediment problem in Jump Creek. The first is soil erosion from fields that border the stream and the second is sediment being added to the creek by agricultural drains and tributaries. Both sources originate from soil erosion off agricultural fields.

Implementation Tiers

In order to achieve the goals set forth in the TMDL Subbasin Assessment, land treatment through BMP installation will be pursued in a three tier format. Agricultural land that drains directly into Jump Creek, or drain directly into agricultural drains that drain directly into Jump Creek is included in **Tier 1**. Tier 1 fields have the most immediate impact on water quality due to their proximity, or influence to a 303 (d) listed stream segment. Unlike Tier 1 fields, **Tier 2** fields are not directly adjacent to a 303 (d) listed stream segment, and the wastewater from Tier 2 acreage has the potential to be reused by Tier 1 acreage before entering a 303 (d) listed stream segment. **Tier 3** fields are located in the uplands where wastewater has the potential to be used multiple times by Tier 2 and Tier 1 acreage before entering a stream segment of concern.

The Jump Creek Sub-watershed consists of a total of 21,790.9 acres, but only 17,790.3 acres (81.6%) actually produces agricultural crops. Table I below shows the total farmable acres in each of their respective categories.

Table 1. Jump Creek Sub-watershed

Treatment Unit	Acres	Percentage of Total Ag. Acres
Tier 1: surface irrigated cropland	524.6	2.9%
Tier 2: surface irrigated cropland	6836.5	38.5%
Tier 3: surface irrigated cropland	2295.2	12.9%
Irrigated Pasture	1409.2	7.9%
Sprinkler irrigated cropland	6425.2	36.1%
CAFO/AFO	299.6	1.7%
Total	17790.3	100%

Jump Creek

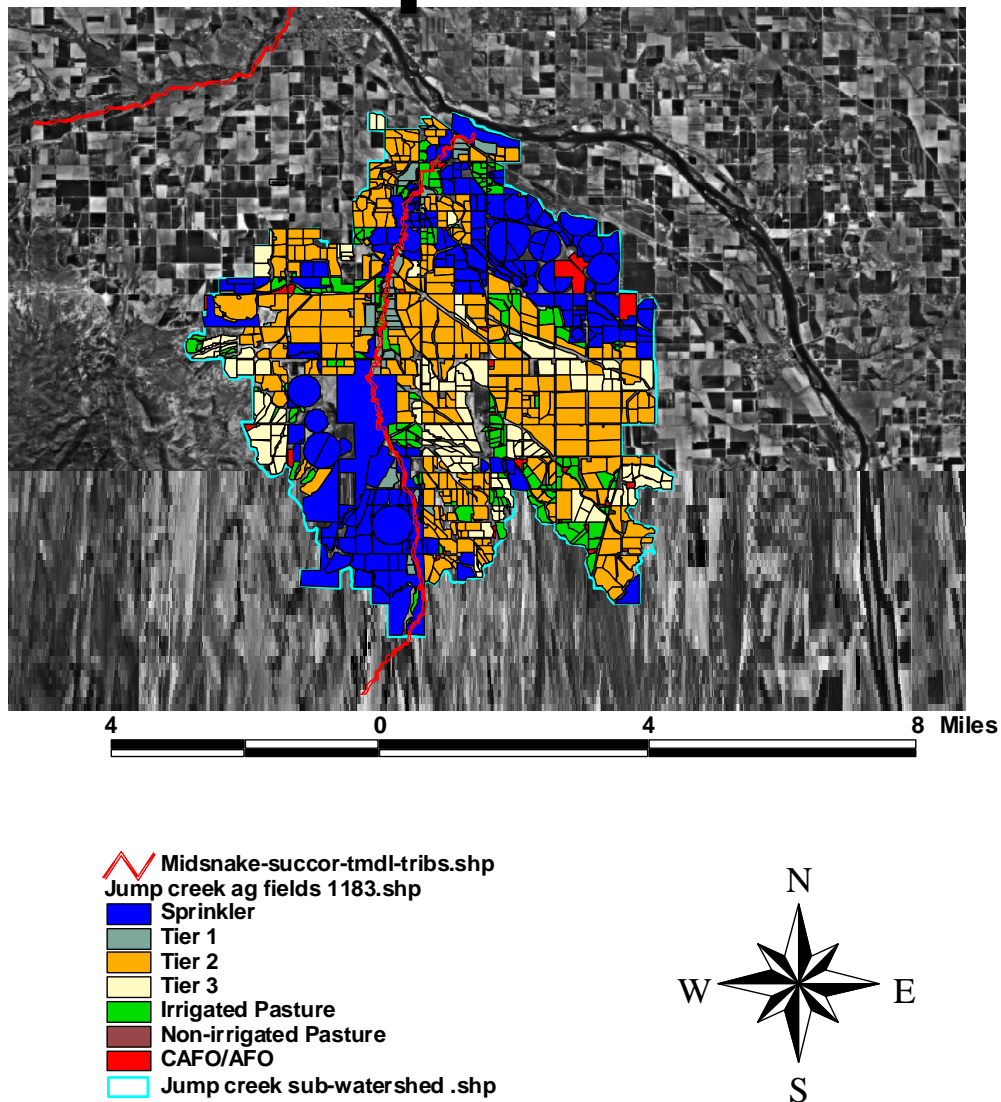


Figure 2. Jump Creek Tier Map

In terms of BMP implementation Tier 1 Fields are high priority, Tier 2 Fields are medium priority, and Tier 3 Fields are low priority in terms of water quality.

Implementation Plan BMPs

Agricultural conservation and soil erosion practices are typically referred to as Best Management Practices (BMPs). These practices are nationally derived systems to control, reduce, or prevent soil erosion and sedimentation on agricultural land uses (APAP, 2003). BMPs are selected to reduce irrigation-induced and streambank erosion, contain and filter sediment, nutrients, and bacteria from irrigation wastewater, contain and properly dispose of animal wastes, and reduce leaching of nutrients and pesticides. Proper implementation of BMPs on agricultural fields within the Jump Creek Sub-watershed will improve the quality of surface water in the project area and reduce pollutant loading to the Snake River from Jump Creek.

BMP Implementation Costs

The cost list to install BMPs on private agricultural land is available from the Owyhee Soil Conservation District office in Marsing and the Bruneau River Soil Conservation District office in Bruneau. These costs have been developed through actual tracking of average BMP installation costs and are used county-wide to determine allowed contracted costs through the USDA Environmental Quality Incentives Program (EQIP). When there is a large distance between material suppliers and the location of installation, there is a greater overall cost for the BMP as a result of the cost for delivery. Where shallow soils exist, fence building materials (as well as installation costs) may differ greatly from typical costs. Since actual costs to install a BMP may not be known until, or after installation, a more accurate watershed-wide budget will be developed during the on-site planning and implementation process. Table 3 provides the typical costs for many of the applicable BMP components for southern Idaho. Labor and equipment costs are not included in this table due to the variation from one site to another.

Table 3. Avg. Costs of Component Practices Applicable to Owyhee County

Component	Unit of Measure	Cost/Unit
Anionic Polyacrylamide (PAM)	Acre	\$ 12.50
Cover Crop	Acre	\$ 30.00
Deep Tillage	Acre	\$ 12.00
Fence, 4 wire	Feet	\$ 1.40
Filter Strip	Acre	\$ 200.00
Irrigation (surge irrigation)	Acre	\$ 750.00
Irrigation (pivot)	Acre	\$1320.00
Irrigation (wheel line system)	Acre	\$1125.00
Prescribed Grazing, Irrigated Pasture	Acre	\$ 1.10
Prescribed Grazing, Rangeland	Acre	\$ 0.11
Pest Management (Noxious Weeds)	Acre	\$ 40.00
Nutrient Management	Acre	\$ 0.00
Spring Development	Each	\$2,000.00
Trough or Tank	Each	\$ 990.00
Streambank & Shoreline Protection	Each	Job Estimate
Stream Channel Stabilization	Each	Job Estimate
Wildlife Watering Facility	Each	\$ 500.00
Watering Facility, Nose pump	Each	\$ 550.00

Costs may increase with greater travel distances and accessibility

****Source: NRCS 2005 EQIP Cost List – Average Costs, For Estimates Only**

Example Description of Alternatives for Surface Irrigated Cropland (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP
Alternative #1a
(\$1520/acre)**

Irrigation Water Mgmt.
Drip Irrigation System
Nutrient Mgmt. Surface
Conservation Crop Rotation
**Alternative #1b
(\$920/acre)**
Sprinkler Irrigation
Nutrient Mgmt.
Conservation Crop Rotation
Irrigation Water Mgmt.

**SITE SPECIFIC BMP
Alternative #2
(\$575/acre)**

Irrigation Water Mgmt.
Land Leveling
Irrigated System
Gated Pipe
Tail Water Recovery System
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

**SITE SPECIFIC BMP
Alternative #3
(\$300/acre)**

Irrigation Water Mgmt.
Concrete Ditch
Filter Strip
PAM
Sediment Basin
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

Example Description of Alternatives for Surface Irrigated Pasture (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

SITE SPECIFIC BMP Alternative #1 (\$520/acre)	SITE SPECIFIC BMP Alternative #2 (\$400/acre)	SITE SPECIFIC BMP Alternative #3 (\$290/acre)
Fencing Planned Grazing System Pasture & Hayland Mgmt. Nutrient Mgmt. Heavy Use Protection Livestock Watering Fac. Irrigation Water Mgmt Field Border Irr. System Gated Pipe	Fencing Planned Grazing System Pasture & Hayland Mgmt. Nutrient Mgmt. Irrigation Water Mgmt. Livestock Watering Fac. Field Border Irr. System	Fencing Pasture & Hayland Mgmt. Nutrient Mgmt. Livestock Watering Fac. Irrigation Water Mgmt. Field Border Irr. System

Table 4. Estimated BMP Cost Summary of Treatment Alternatives for the Jump Creek Sub-watershed, Tier 1 Fields.

ALTERNATIVE	ACRES	Total Costs
Alternative 1a \$1520 / AC	524.6	\$ 797,992
Alternative 1b \$ 920 / AC	524.6	\$ 482,632
Alternative 2 \$ 575 / AC	524.6	\$ 301,645
Alternative 3 \$ 300 / AC	524.6	\$ 157,380

Table 5. Estimated BMP Cost Summary of Treatment for the Jump Creek Sub-watershed, Tier 1 & Tier 2 Fields.

ALTERNATIVE	ACRES	Total Costs
Alternative 1a \$1520 / AC	7361	\$ 11,188,720
Alternative 1b \$ 920 / AC	7361	\$ 6,772,120
Alternative 2 \$ 575 / AC	7361	\$ 4,232,575
Alternative 3 \$ 300 / AC	7361	\$ 2,208,300

Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.

Tasks for Privately Owned Parcels

Task 1: Develop conservation plans with private agricultural landowners.

Responsible

Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)

Timeline: Ongoing

Task 2: Assist private agricultural landowners to implement conservation plan components.

Responsible

Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)

Timeline: Ongoing

Task 3: Monitor conservation implementation progress on cropland and evaluate effect on riparian area along Jump Creek.

Responsible

Agencies: IASCD & ISCC (support from NRCS, IDL and BLM)

Timetable: Ongoing

APPENDIX #3

Sinker Creek Subwatershed

As shown in Figure 1.13, Sinker Creek drains approximately 51,671 acres of primarily rangeland. A fourth order, low to moderately sinuous stream, Sinker Creek originates at over 8,000 feet in the Silver City Range of the Owyhee Mountains and flows in a northerly direction into the Snake River at 2,400 feet. Hulet Reservoir is located 12.9 miles upstream from the mouth of Sinker Creek.

Sinker Creek is perennial except in extreme drought years. However, the stream goes dry near the mouth due to flow diversions. Additionally, the nearby Nahas Reservoir is filled with water from Sinker Creek. Sinker Creek cuts through steep V-shaped basalt canyon in places and in others opens up into small low gradient valleys. In the canyon areas, the channel shape is trapezoid , and more dish shaped in the cropland areas.

Land Ownership and Land Use

The primary land use within the publicly held portion is rangeland grazing. Both irrigated agriculture and rangeland grazing occur in the privately owned portion. Table1 shows stream length by ownership and Figure 1 shows land use. Irrigated agriculture is limited to two areas along Sinker Creek. The first area is very small irrigated permanent pastures along the creek above Highway 78 on the Joyce Ranch and the second is flood irrigated croplands down stream about 2 miles on the John Edwards Ranch.

Table 1. Stream Length by Ownership		
NAME	Length (Miles)	Percent
B.L.M.	5.8	29%
Private	13.3	66%
State of Idaho	1.1	5%
Total Miles within 5th Field HUC	20.2	

Private Land Riparian Resource Concerns

Riparian/wetland vegetation

All of the reaches assessed by the Idaho Soil Conservation Commission Riparian Team in 2003 on Sinker Creek were found without adequate stabilizing vegetative species (SC 1-18). Vigor was found to be poor in all but 2 reaches (SC11 & 12). Regeneration of riparian species is limited throughout most of the stream reaches (except for SC12). Water was found to be adequate (within shallow aquifer) for maintaining riparian vegetation, except in SC1, just downstream of the reservoir. However, cottonwood trees regenerate on new gravel deposits formed by adequate storm flows. Because of the reservoir, storm flows are no longer creating gravel deposits downstream.

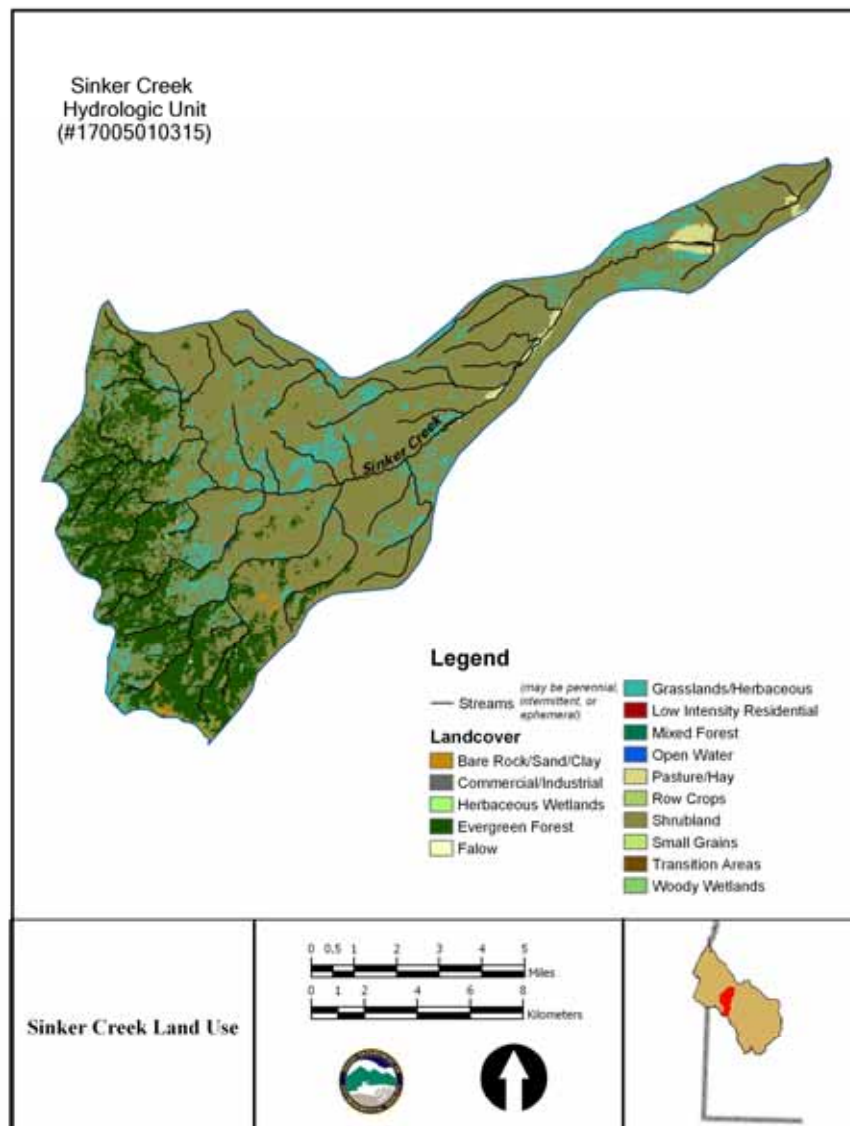


Figure 1. Sinker Creek Land Use

Lateral Stream Bank Erosion – Floodplain Development

No reaches were found to have excessive lateral stream bank erosion with an outward development of its floodplain. This is mainly due to the reservoir's buffering effect on storm flows and the cobble dominated channel.

Channel Down-cutting

No active head cuts were found within any of the eighteen reaches assessed in Sinker Creek.

Various Riparian Attributes

See table 2 below.

Table 2. Various Attributes						
Stream Reach	Beaver Dams?	Beaver Dams Stable?	Excessive Bank Erosion	Excessive Deposition?	Unstable Head Cuts	Floodplain developing outward?
Sinker CreekSC1	NO	NO	NO	NO	NO	NO
Sinker CreekSC2	NO	NO	NO	NO	NO	NO
Sinker CreekSC3	NO	NO	NO	NO	NO	NO
Sinker CreekSC4	NO	NO	NO	NO	NO	NO
Sinker CreekSC5	NO	NO	NO	NO	NO	NO
Sinker CreekSC6	NO	NO	NO	NO	NO	NO
Sinker CreekSC7	NO	NO	NO	NO	NO	NO
Sinker CreekSC8	NO	NO	NO	NO	NO	NO
Sinker CreekSC9	NO	NO	NO	NO	NO	NO
Sinker CreekSC10	YES	NO	NO	NO	NO	NO
Sinker CreekSC11	YES	YES	NO	NO	NO	NO
Sinker CreekSC12	YES	YES	NO	NO	NO	NO
Sinker CreekSC13	NO	NO	NO	NO	NO	NO
Sinker CreekSC14	NO	NO	NO	NO	NO	NO
Sinker CreekSC15	NO	NO	NO	NO	NO	NO
Sinker CreekSC16	NO	NO	NO	NO	NO	NO
Sinker CreekSC17	NO	NO	NO	NO	NO	NO
Sinker CreekSC18	NO	NO	NO	NO	NO	NO

Land Ownership

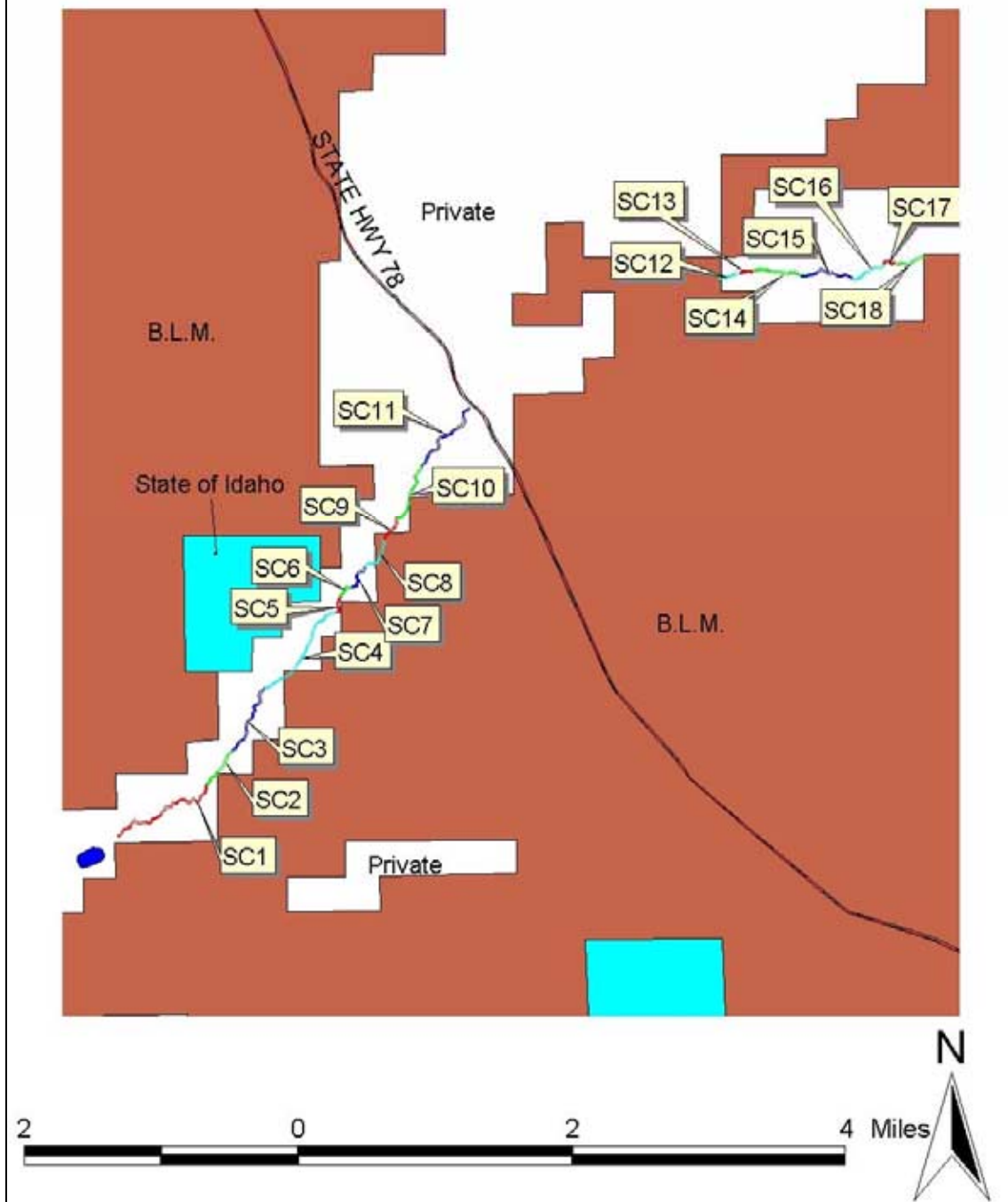


Figure 2. Sinker Creek Land Ownership

Private Land Riparian Improvement Recommendations

The result of the 2003 stream inventory and the interpretation of the data indicate that there are areas in need of improvement. Conservation plans should be developed with landowners to establish Best Management Practices to improve and maintain healthy riparian conditions. The author has identified areas of greater priority for improvements. High priority areas are determined by the stream's current "state of transition" and how effective a BMP will improve conditions. A recently down-cut stream may respond slowly to grazing management adjustments while its floodplain is still increasing in an outwardly direction. In comparison, a stream with a well-developed floodplain may respond very well to a given change in grazing practices. Each stream reach, in many cases, each pasture, needs to be evaluated on its own merits. What works well in one area may not work at all in another. There are two actions that should be implemented soon: offsite water facilities and a reduction in grazing duration. These two actions are certain to provide some level of improvement and protection of existing riparian areas.

All of the reaches assessed in 2003 need some level of management change. Many reaches were found to be lacking in riparian vegetation, possibly in a downward vegetative trend, but stability does not seem to be such a problem because of the reservoir.

Private Land Priority Treatment Areas

The riparian areas in need of grazing management adjustments could be accomplished with or without the use of structural components such as fencing. However, additional water developments and pasture fencing could make it easier to control livestock distribution and grazing intensity.

Some stream reaches will improve more quickly than others due to their current condition and available water. It seems, due to the affect of the reservoir on storm flows, the reaches may not need such a wide floodplain. There does not seem to be excessive erosion as annual flows and large storm flows are being buffered out by the reservoir. Today, however, riparian vegetation regeneration is more important than protection from stream bank erosion. Channel diversity (pools, riffles, etc.) will develop slowly, due to altered flows and the cobble dominated channel that makes up Sinker Creek.

The author has determined that the riparian conditions are the result of "in-stream" activities and not upland related. There was no evidence that excessive stream bank erosion or deposition is caused from poor upland conditions. This determination does not imply absence of problems in the uplands, but that there is no evidence that upland problems are directly impacting stream function. Regarding the TMDL objectives for the streams assessed in 2003, the primary focus should be on the riparian areas themselves.

There seems to be adequate floodplain (outward development) on most all of the reaches. There are no indicators present that indicate the stream is seeking additional outward floodplain. Inward floodplain development is still needed on all reaches, as most reaches are dish shaped, with over widened channels. Reaches SC11 & 12 are excluded from this observation, however, because of the beaver dams. This inward floodplain development would decrease the appearance of 'dish-shaped' channels and increase trapezoid-shaped channels. Since this stream is mostly dominated with cobble and gravel, it is not as likely to create a true 'trapezoid'-shape channel. Stream reach SC6 seems to contain a trapezoid shaped channel, created mostly by the cottonwood trees.

Stabilizing vegetation is very influential on channel shape. Vegetation can decrease channel bank full widths, creating trapezoid-shaped channels, and ultimately increasing floodplains inwardly. As dish-shaped channels are converted to trapezoid shaped channels, it is likely that the excess fine material trapped within channel will be scoured out, thus reducing stream embeddedness. In reaches SC1 to SC10, cottonwood and black willow trees dominate the riparian area greatly restricting material fines in the stream. Downstream in reaches SC12 – SC18, sedges seem to have a greater role in channel shape development where the channel holds a greater amount of fine material within the system.

The average gradient is about 1.1% (range 0.5 to 1.8%). In general, lower gradient streams usually consist of smaller sized parent materials, however, this was a depositional area with cottonwood as the dominant vegetative species. Gravel and cobble sized material are dominant here until the lower reaches (SC12 - SC18). The lower reaches are low gradient and consist of a larger portion of sand, silt and clay material.

If channel widths are decreased, average bank full depths will increase. This will increase more trapezoid-shaped channels and increase floodplain inwardly. In low gradient streams, riparian vegetation actually creates and maintains floodplain development. Riparian vegetation usually starts within newly developed floodplains by first establishing colonizing riparian plant species. These colonizers are later replaced by stabilizing riparian species as natural succession continues. In the later stages of a developing riparian area, woody vegetation such as whiplash willow, cottonwood, and alder will become established and create a greater shading potential in and around the wetland areas. Shrubs, by nature, can provide a greater amount of shading on narrow streams due to their density, compared to larger trees. The greater the stream channel width, the less potential shading is available to the water, due to the vegetation crown width limits. Where the TMDL is calling for a 12 percent increase in shade, from 0.5 miles south of highway 78 to nearly the mouth, improvements could be made from SC13 to SC18 on private land. The improvements in channel shape may provide for lower stream temperatures before an increase in shading could, given the soil types and water availability.

Most of these stream reaches are capable and do support woody species (trees and shrubs), but at different quantity levels. Riparian woody species are restricted by water availability, elevation to surface, soil type, and availability of parent stock.

Based on assessments, there are “reference” stream reaches within the Sinker Creek that represent better riparian conditions within the sub-watershed. The right bank (looking downstream) of SC6 seems to represent the possible channel shape (see picture to right). This reach closely represents the initial potential for riparian stability, vegetation cover, and diversity within the stream. The left bank, as shown in the picture to the right, of course, does not show the trapezoid shape.

This is just upstream of a stream crossing. It is not unusual to find a patchwork of vegetation and channel shape along many of the riparian areas, interrupting a continuous line of vegetation.



Due to soil variability, rocky terrain, vegetative diversity, and soil moisture, a continual line of shading does not occur. Stream channel meandering both shades and exposes water surfaces to direct sunlight. Valley aspect (i.e. south vs. west flowing channels) also influences the shading and the greater the sinuosity the more diverse the shading characteristics. Sinker Creek flows basically flows from southwest to northwest (from the reservoir to mouth), somewhat perpendicular to the sun’s daily summer path.

If width-depth ratios are decreased, primarily by decreasing channel width, average depth will increase which will increase water velocities. This of course, could increase fishery habitat (deeper pools and riffles in ≤ 2 percent gradients) while increasing soil to water contact. The greater the soil-to-water contact, the greater the cooling affect of the ground water and soils have on overall stream temperature. Narrowing the channel should also get at reducing fine material in the channel, addressing the TMDL sediment objectives (8.64% reduction in stream bank erosion).

To further improve stability and shading, the duration of grazing should be reduced. Watering facilities are needed and fencing may be needed to increase the number of pastures to increase rotation and decrease duration. The primary reason to reduce duration and adjust timing is to increase and protect the riparian vegetation. Allowing new vegetation growth each year will create multiple age classes, which increases both the quantity and quality of stabilizers along the stream bank in order to ensure long-term bank stability. There is a concern however with cottonwood regeneration. Future cottonwood growth will likely be limited to a narrow band along the stream channel, while there is little storm flow disturbance to create gravel bars. A natural transition to other riparian species may be occurring. Russian olive trees are more dominant near Highway 78.

A Proper Function Condition (PFC) Assessment was completed for the reaches. Based on the assessments and the data collected, the author has prioritized which stream reaches should be addressed. The typical criteria for the prioritization are as follows:

1. Reaches that have full outwardly developed floodplains, whereas no excessive lateral stream bank erosion is indicating active outward floodplain development,
2. Floodplains exist and are inundated with relatively frequent flood events (every 1-2 years),
3. A diverse community of riparian-wetland vegetative species exists,
4. Adequate soil moisture for riparian-wetland species to exist.

Table 3. Stream Reach Condition Summary

Stream Name	Adequate stabilizing vegetative species present	Excessive lateral streambank erosion	Active & unstable headcuts present	Flow Alterations- Shallow ground water	Rated at Proper Functioning Condition (PFC)	High potential for successful treatment	Low potential for successful treatment
	Stream Reach (es)						
Sinker Creek	N/A	N/A	N/A	SC1,4	SC11,12	SC2,3, SC5-10 SC13-18	SC1,4

Reaches with high potential for improvement

These stream segments will improve rapidly with the implementation of certain BMPs.

Reaches with low potential for improvement

Flow alteration and shallow ground water supply seems to be the most limiting factor in these two reaches.

Reaches nearly at PFC, but in need of some additional improvement

SC 11 & 12 – There exist active beaver dams within these two reaches. Some utilization of riparian species is higher than desired. The upstream portion of SC12 is in good condition, but the lower portion could use some improvement. The inevitable loss of food supply for beaver can compromise the integrity of the dams. By allowing existing riparian vegetation to stabilize the dams, it should reduce the risk of failure if the beaver leave the area.

Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.

Tasks for Privately Owned Parcels

Task 1: Develop conservation plans with private agricultural landowners.

Responsible

Agencies: IASCD, ISCC & NRCS (support from IDL, and BLM)

Timeline: Ongoing

Task 2: Assist private agricultural landowners to implement conservation plan components.

Responsible

Agencies: IASCD, ISCC & NRCS (support from IDL, and BLM)

Timeline: Ongoing

Task 3: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.

Responsible

Agency: IASCD & ISCC (support from NRCS, IDL, and BLM)

Timeline: Ongoing

APPENDIX #4

Succor Creek Subwatershed (Upper & Lower)

Succor Creek is a 67.3-mile long stream located in the states of Idaho and Oregon. The elevation change in the watershed is 4,400 feet, with the elevation of the headwaters at 6,600 feet and mouth at 2,200 feet. The headwaters of Succor Creek are located approximately 6 miles north of DeLamar, near Johnson Lakes in Owyhee County, Idaho. After flowing in a northeasterly direction to near Rooster Comb Peak, Succor Creek turns to the northwest for approximately 5 miles. The stream then turns to the southwest and enters Succor Creek Reservoir. The reservoir was constructed in 1979 for agricultural storage. After exiting the reservoir, Succor Creek continues to flow in a southwesterly direction for another mile. It then turns to the northwest until it enters Oregon. This entire segment of Succor Creek will be referred to as Upper Succor Creek in this TMDL Implementation Plan. In Oregon, Succor Creek travels primarily directly north. The stream flows through agricultural land, rangeland and Succor Creek State Park. Succor Creek exits Oregon 5.4 miles above Homedale, Idaho, and travels in a northeasterly direction to its confluence with the Snake River. This segment of Succor Creek (in Idaho) will be referred to as Lower Succor Creek in this TMDL Implementation Plan. Only the portions of Succor Creek that are in Idaho are addressed in this Implementation Plan.

During most years, the entirety of upper Succor Creek is classified as a perennial stream, due to the presence of scattered naturally perennial pools that support aquatic life. However, in most years there is no evident flow of water between the pools. Above the reservoir, flow occurs as a direct result of spring snowmelt and the subsequent bank storage. Below the reservoir to the Oregon Line, flow is largely affected by the discharge from Succor Creek Reservoir and the stream rarely is without water. In the lower segment (lower Succor Creek) near Homedale (Oregon Line to Snake River), the stream is a perennial flowing stream, due to natural springs flowing into Succor Creek and agricultural return water.

Land Ownership and Land Use

The primary land use within the publicly and privately held portion of the Upper Succor Creek watershed is livestock grazing. Within the privately held portion of Lower Succor Creek, the land uses are primarily agricultural related activities such as intensive row crop farming and livestock grazing on irrigated pastures. Most of the cropland within the Lower Succor Creek sub-watershed is flood irrigated, with only a small percentage of sprinkler irrigation at the present time. Figure 1 shows the land use patterns within the Idaho portions of the Succor Creek watershed (DEQ 2002a). Note: The headwaters drainage of Succor Creek (Upper Succor Creek) is depicted on the bottom of the map and the mouth of Succor Creek (Lower Succor Creek) is depicted on the top of the map.

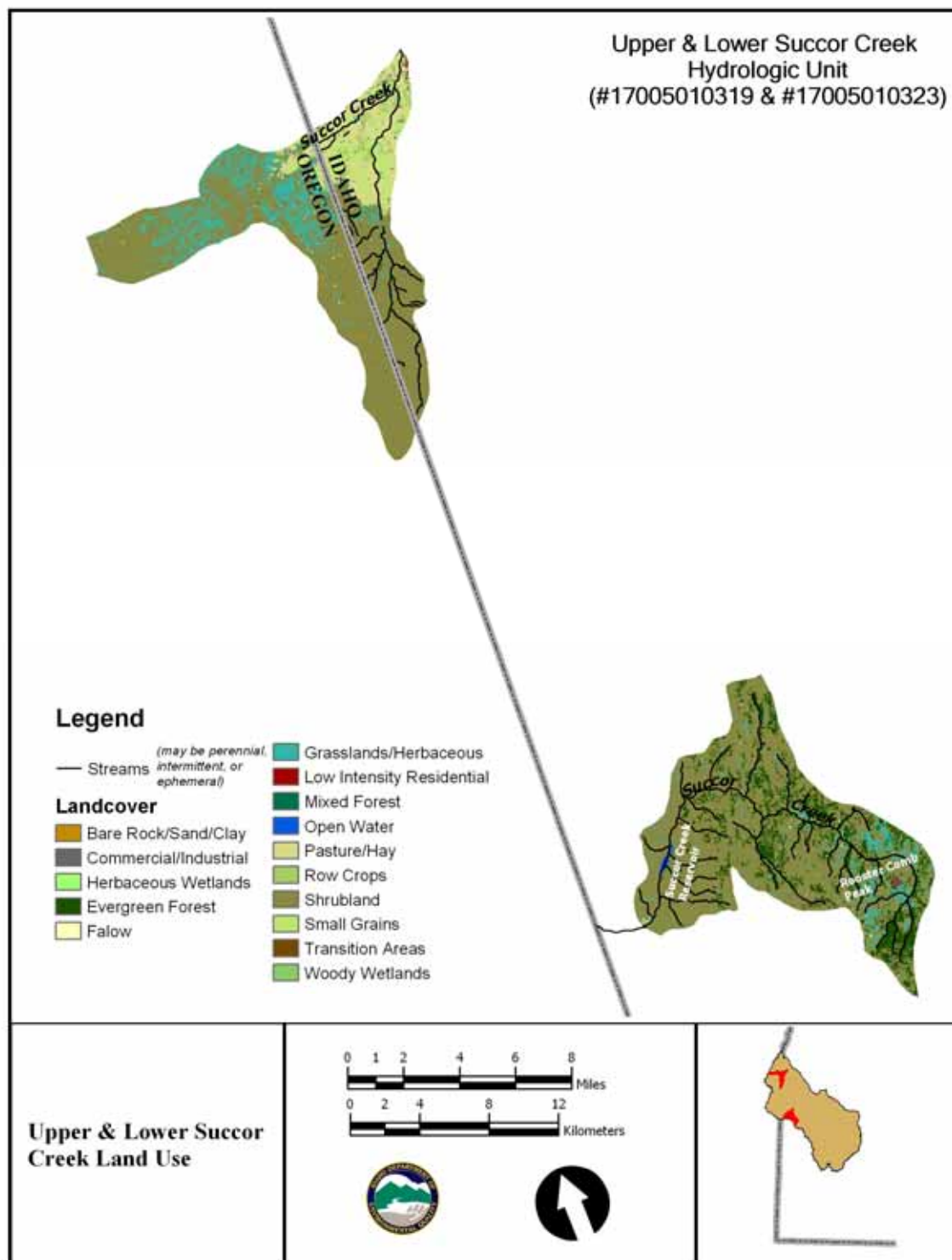


Figure 1. Upper and Lower Succor Creek Land Use

Upper Succor Creek Subwatershed

Private Land Riparian Resource Assessment

The purpose of this section is to provide a brief description of the riparian areas assessed in 2003.

Priority Riparian Areas

Grazing related impacts on private lands within Upper Succor Creek are of primary concern. The land use surrounding this water body is primarily livestock grazing. Livestock grazing is currently having varying degrees of impact on riparian health and stream function.

Private land ownership

Table 1 summarizes the land ownership in the Upper Succor Creek 5th field subwatershed. The subwatershed boundary for this report ends at the Idaho/Oregon State Line, even though the actual subwatershed overlaps into Oregon. The total acres will be slightly less than the actual for the Upper Succor subwatershed. There are just over 35 thousand acres within this subwatershed. Table 2 on the following page shows stream ownership in miles. Again, this only represents the Upper Succor Creek area. According to IDEQ 2003, there are approximately 67 total stream miles (headwaters to mouth on Snake River). Notice that an analysis by land area shows that 52% is comprised of private land. Table 2 shows ownership by stream miles, 66% is on private lands.

Upper Succor Creek

Table 1. Land Ownership		
NAME	Acres	Percent
B.L.M.	10881	31%
Open water	181	<1%
Private	18423	52%
State of Idaho	5715	16%
Total of Acres within HUC	35199	

The stream miles in Table 2 have been derived from ArcView shape files called idown and hydro100k, found on the state ftp GIS site (<http://www.idwr.state.id.us/ftp/gisdata/>). There exists a high degree of error in hydro100 stream lengths due to the method used to digitize the stream segments. All of the segment's lengths are shorter than actual. For the purposes of comparison in Table 2, however, the lengths used here are adequate.

Upper Succor Creek

Table 2. Stream Length by Ownership		
NAME	Length (Miles)	Percent
B.L.M.	3.0	15%
Open water	1.5	8%
Private	13.2	66%
State of Idaho	2.2	11%
Total Miles within 5th Field HUC	19.9	

Private land use/management

Based on the 2003 assessments within most of the water listed in Table 2, most all have been found to still have active riparian livestock grazing. There are public land allotments associated with these private land areas. These allotments consist of BLM and State managed lands. Multiple resources are managed and grazing duration and locations are adjusted according to BLM policy regarding these various resources. Private lands are often used as holding areas before and after public land grazing periods. Most private land areas consist of wider valleys with lower stream gradients. These areas private land areas were found more suitable to new comers for homesteading.

Allotments/pastures:

These allotments include state, Bureau of Land Management (BLM), and privately owned lands. Public land management agencies manage the public lands for multiple resources and purposes. Cattle grazing is the primary land use within the Upper Succor Creek Sub-Watershed. Wildlife use is diverse and periodically heavy in the Owyhee area.

Annual Precipitation (snow & rain)

According to the Western Regional Climate Center (<http://www.wrcc.dri.edu/>), climate summaries for Silver City and Reynolds Creek Idaho, precipitation ranges from 10 to 21 annual inches of snow and rain. Monthly averages range from 0.5 to 3.0 inches.

Air temperature

According to the Western Regional Climate Center (<http://www.wrcc.dri.edu/>), climate summaries, temperature data for Silver City and Reynolds Creek Idaho, air temperatures range from 20 to 86 °F.

Private Land Riparian Resource Problems

Riparian/wetland vegetation

Those reaches found without adequate stabilizing vegetative species are:

USC 1-10, 12-23, 25, & 28

Lateral Stream Bank Erosion – Floodplain Development

Stream reaches found to have excessive lateral stream bank erosion with an outward development of its floodplain:

USC 5, 6, 10, 12, 13, 15, 20, 22, 23, 25, 27, & 28

Channel Down-cutting

Only two stream reaches have been found to contain active, unstable head cuts:

USC 3 & 12

Various Riparian Attributes

See table 3 below.

Table 3. Various Attributes						
Stream Name	Beaver Dams?	Beaver Dams Stable?	Excessive Bank Erosion	Excessive Deposition?	Unstable Head Cuts	Floodplain developing outward?
Succor CreekUSC1	NO	NO	NO	NO	NO	NO
Succor CreekUSC2	NO	NO	NO	NO	NO	NO
Succor CreekUSC3	NO	NO	NO	NO	YES	NO
Succor CreekUSC4	NO	NO	NO	NO	NO	NO
Succor CreekUSC5	NO	NO	YES	YES	NO	YES
Succor CreekUSC6	NO	NO	YES	NO	NO	YES
Succor CreekUSC7	NO	NO	NO	NO	NO	NO
Succor CreekUSC8	NO	NO	YES	NO	NO	NO
Succor CreekUSC9	NO	NO	YES	NO	NO	NO
Succor CreekUSC10	YES	YES	YES	NO	NO	YES
Succor CreekUSC11	YES	YES	NO	NO	NO	NO
Succor CreekUSC12	NO	NO	YES	NO	YES	YES
Succor CreekUSC13	NO	NO	YES	NO	NO	YES
Succor CreekUSC14	NO	NO	YES	NO	NO	NO
Succor CreekUSC15	NO	NO	YES	NO	NO	YES
Succor CreekUSC16	NO	NO	YES	NO	NO	YES
Succor CreekUSC17	NO	NO	NO	NO	NO	NO
Succor CreekUSC18	NO	NO	NO	NO	NO	NO
Succor CreekUSC19	NO	NO	NO	NO	NO	NO
Succor CreekUSC20	NO	NO	YES	NO	NO	YES
Succor CreekUSC21	NO	NO	NO	NO	NO	NO
Succor CreekUSC22	NO	NO	YES	NO	NO	YES
Succor CreekUSC23	NO	NO	YES	NO	NO	YES
Succor CreekUSC24	NO	NO	NO	NO	NO	NO
Succor CreekUSC25	NO	NO	YES	NO	NO	YES
Succor CreekUSC26	NO	NO	NO	NO	NO	NO
Succor CreekUSC27	NO	NO	YES	NO	NO	YES
Succor CreekUSC28	YES	YES	YES	NO	NO	YES

Land Ownership

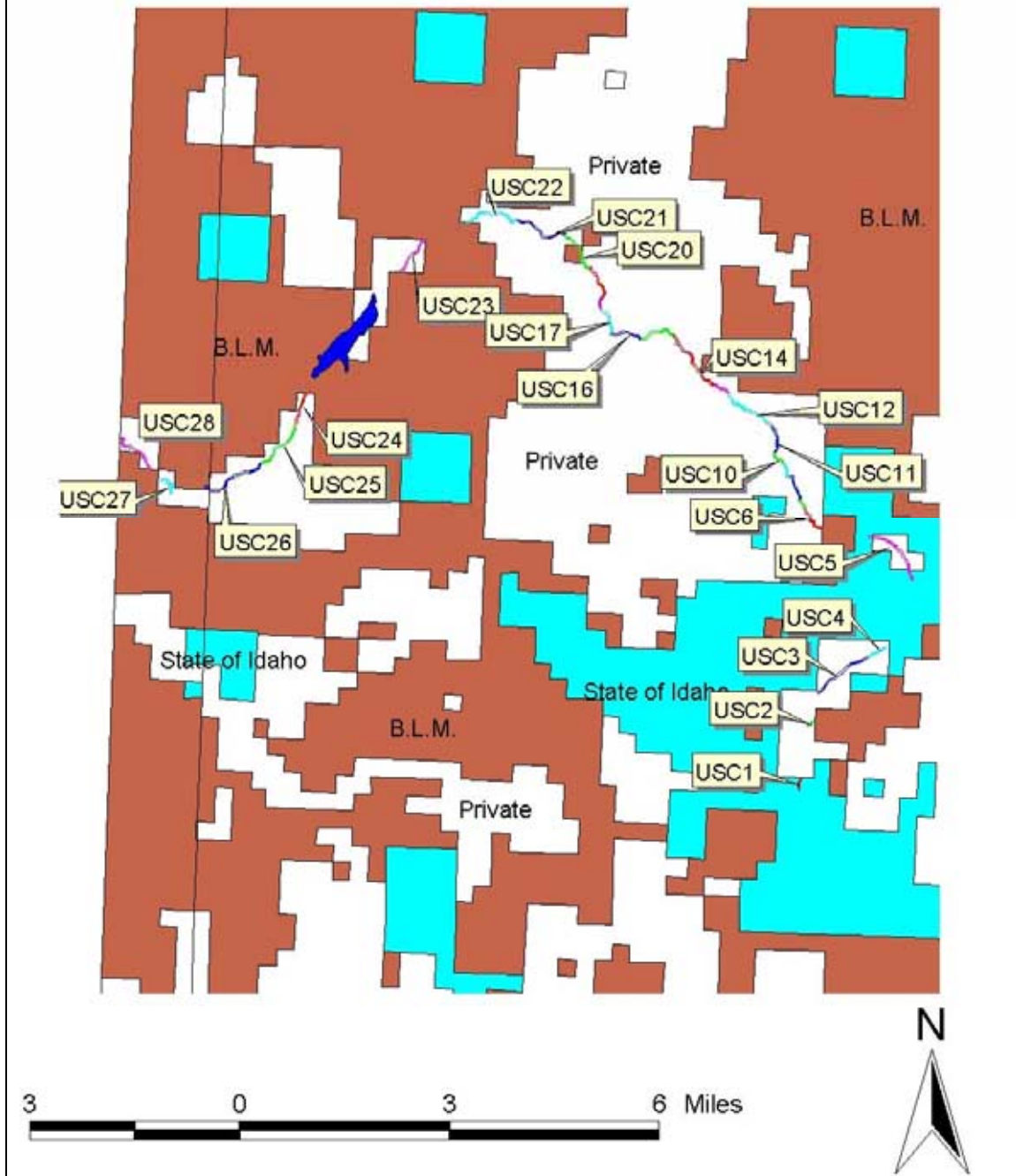


Figure 2. Upper Succor Creek Land Ownership

Private Land Riparian Improvement Recommendations

The result of the 2003 stream inventory and the interpretation of the data indicate that there are areas in need of improvement. Conservation plans should be developed with landowners to establish Best Management Practices to improve and maintain healthy riparian conditions. The author has identified areas of greater priority for improvements. High priority areas are determined by the stream's current "state of transition" and how effective a BMP will improve conditions. A recently down-cut stream may not respond well to any grazing management adjustments while it is still increasing floodplain capacity. In comparison, a stream with a well-developed floodplain may respond very well to a given change in grazing practices. Each stream reach, in many cases, each pasture, needs to be evaluated on its own merits. What works well in one area may not work at all in another. There are two certain actions that should be implemented soon: offsite water facilities and head cut stabilization. These two actions are certain to provide some level of improvement and protection of existing riparian areas.

Not all of the reaches assessed in 2003 will require management changes. Most reaches were found in to be in an upward vegetative trend, but still in need of channel shape and stability improvements (see priorities below). It is important to note however that those stream channels and riparian areas found in good condition need to be maintained. Also, further improvement in channel complexity, such as those characteristics desired by aquatic species, should continue to improve with time under current management.

Private Land Priority Treatment Areas

Some of the riparian areas that are in need of grazing management adjustments could be accomplished with or without the use of structural components such as fencing. However, additional water developments and pasture fencing could make it easier to control livestock distribution and grazing intensity.

Some stream reaches will improve more quickly than others due to their current condition and stage of stream development. Streams with well-developed flood plains should respond more quickly to grazing management adjustments. These stream reaches should be of higher priority for conservation plan development.

The author has determined that the riparian conditions are the result of "in-stream" activities and not upland related. There was no evidence that excessive stream bank erosion or deposition is caused from poor upland conditions. This determination does not imply absence of problems in the uplands, but that there is no evidence that upland problems are directly impacting stream function. Regarding the TMDL objectives for the streams assessed in 2003, the primary focus should be on the riparian areas themselves.

There seems to be adequate floodplain (outward development) on about 47% of the stream reaches assessed. The remaining 53% of the reaches require additional outward floodplain development. Inward floodplain development is still needed on about 89% of the stream segments assessed. This inward development will decrease the appearance of 'dish-shaped' channels and increase trapezoid-shaped channels in gravel, sand and silt/clay-dominated streams. This stream is mostly dominated with gravel and cobble, which are not as likely to create a true 'trapezoid' shaped channel, due to the decreased ability of grass-like vegetation to dominate within this substrate. The average gradient is about 1.6% (range 0.8 to 7.5%). In general, lower gradient streams usually consist of smaller sized material, while this stream, due to its high gradient and geology, consists mostly of gravel and cobbles.

Stabilizing vegetation is very influential on channel shape. Vegetation can decrease channel bankfull widths, creating trapezoid-shaped channels, and ultimately increasing floodplains inwardly. As dish-shaped channels are converted to trapezoid shaped channels, it is likely that the excess fine material trapped within channel will be scoured out to some extent, thus reducing stream embeddedness.

If channel widths are decreased, average bankfull depths will increase. This will increase more trapezoid-shaped channel and increase floodplain inwardly. In low gradient streams, riparian vegetation actually creates and maintains floodplain development. Riparian vegetation starts in a newly developed floodplain by first establishing colonizing riparian plant species. These colonizers are later replaced by stabilizing riparian species as natural succession continues. In the later stages of a developing riparian area, woody vegetation such as whiplash willow, cottonwood, and alder will become established and create a greater shading potential in and around the wetland areas. Shrubs, by nature, can provide a greater amount of shading on narrow streams due to their density, compared to larger trees. The greater the stream channel width, the less potential shading is available to the water, due to the vegetation crown width limits.

Most of these stream reaches are capable and do support woody species (trees and shrubs), but at different rates and quantities. Riparian woody species are restricted by water availability, elevation to surface, soil type, and availability of parent stock.

Based on assessments, there are "reference" stream reaches within the watershed that do in fact represent better riparian conditions within the watershed. These are USC11, 24, and 26. USC 11 a beaver complex, however, should not be used to characterize resource targets elsewhere. These reaches closely represent the potential for riparian stability, vegetation health, and diversity within the stream. Channel diversity, however, is still improving in these reaches. It is not unusual to find a patchwork of vegetation along many of the riparian areas, interrupting a continuous line of vegetation.

In steeper gradient and narrow channel streams with cobble substrate, a continual line of alder or various species of willows may occur. On lower gradient streams, where channel material is diverse and different types of deposition are found at various locations across the valley bottom, riparian vegetation responds accordingly. Due to soil variability, rocky terrain and vegetative diversity, a continual line of shading does not occur. Stream channel meandering both shades and exposes water surfaces to direct sunlight. Valley aspect (i.e. south vs. west flowing channels) also influences the shading and the greater the sinuosity the more diverse the shading characteristics.

If width-depth ratios are decreased, primarily by decreasing channel width, average depth will increase which will increase water velocities. This of course, increases fishery habitat (deeper pools and riffles in ≤ 2 percent gradients) while increasing soil to water contact. The greater the soil-to-water contact, the greater the cooling affect ground water and soils have on stream temperature.

To improve stability and shading, the duration of grazing should be reduced. Watering facilities are needed and fencing may be needed to increase the number of pastures to increase rotation and decrease duration. According to some ranchers in the area, there has already been a change in duration, and that is evident on some reaches. The primary reason to reduce duration and adjust timing is to increase and protect riparian vegetation. Allowing new vegetation growth each year will create multiple age classes, which increases both the quantity and quality of stabilizers along the streambank in order to ensure long-term bank stability.

Proper Function Condition (PFC) Assessments, along with other data collection, were completed in the watershed. Based on the assessments and the data collected, the author has prioritized which stream reaches that should be addressed and first. The criteria for the prioritization are as follows:

Reaches that have full outwardly developed floodplains, whereas no excessive lateral streambank erosion is indicating active outward floodplain development,

1. Floodplains exist and are inundated with relatively frequent flood events (every 1-2 years),
2. A diverse community of riparian-wetland vegetative species exists,
3. Adequate soil moisture for riparian-wetland species to exist.

Table 4. Stream Reach Condition Summary

Stream Name	Adequate stabilizing vegetative species present	Excessive lateral streambank erosion	Active & unstable headcuts present	Floodplain development occurring	Rated at Proper Functioning Condition (PFC)	High potential for successful treatment	Low potential for successful treatment
	Stream Reach (es)						
Upper Succor Creek	N/A	N/A	N/A	USC3,12	USC11,24 USC26	USC1-4 USC7-9 USC14,17 USC18,19 USC21	USC5,6 USC10,12 USC13,15 USC16,20U SC22,23 USC25,27 USC28

Note: Even though the criteria used here to categorize these reaches as having lower potential for improvement (i.e. channel shape, width/depth ratio, floodplain development, etc.) there are upward trends in vegetation in some areas. The author predicts that adequate floodplain and diverse channel characteristics will be slower to develop here than other reaches.

Also, those reaches downstream of the reservoir (USC 24 - 28) are not as likely to build and maintain diverse channel characteristics due to regulated flows. While flows are regulated under normal climate conditions (where adequate water is stored), flows are held at an artificial bankfull flow level for longer periods of time, which seems to have created a uniform channel. Storm events are buffered by the reservoir, which reduces channel and floodplain diversity.

Reaches rated at PFC

USC 11, 24, & 26

Tasks for Privately Owned Parcels

Task 1: Develop conservation plans with private agricultural landowners.

Responsible

Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)

Timeline: Ongoing

Task 2: Assist private agricultural landowners to implement conservation plan components.

Responsible

Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)

Timeline: Ongoing

Task 3: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.

Responsible

Agency: IASCD & ISCC (support from NRCS, IDL, and BLM)

Timeline: Ongoing

Task 4: Install “reference reach” transects to define potential and capability of shading of stream channels.

Responsible

Agency: ISCC (support from IASCD, NRCS, IDL, and BLM)

Timeline: Summer of 2006

Lower Succor Creek

Water Quality Issue

Lower Succor Creek is that portion of Succor Creek that flows from Oregon at Idaho's west border to the Snake River below Homedale. The water quality issues we are going to address in Lower Succor Creek are sediment and bacteria. There are two sources of sediment being added to Lower Succor Creek. The first is soil erosion from fields that border the creek and the second is sediment being added to the creek through agricultural drains and tributaries. All sediment originates from soil erosion off agricultural fields. The bacteria problem on Lower Succor Creek originates from irrigated pastures that drain directly and indirectly into the creek.

The overall objective of the TMDL is to achieve water quality that will support appropriate designated uses for Lower Succor Creek as well as the Mid Snake River. The TMDL recognizes that the targets and load reductions may be revised as additional data is collected, as understanding of water quality in the Mid Snake/Succor Watershed improves, and as state water quality standards adapt to reflect new developments.

Agricultural sources of sediment, bacteria and nutrients include erosion from surface irrigated cropland and pastures, runoff from animal feedlots, livestock grazing on or near waterways, and erosion in drainage ditches resulting from continual maintenance. BMPs can be implemented to address the following:

- Irrigation induced erosion
- Irrigation tailwater delivery to receiving water bodies
- Lack of adequate vegetation adjacent to waterways necessary for reducing nutrients and pathogens from runoff.
- Livestock grazing in and adjacent to waterways delivering excess sediment, nutrients, and bacteria.

Implementation Tiers

In order to achieve the goals set forth in the TMDL Subbasin Assessment, land treatment through BMP installation will be pursued in a three tier format. Agricultural land that drains directly into Lower Succor Creek, or drain directly into agricultural drains that drain directly into Lower Succor Creek is included in **Tier 1**. fields have the most immediate impact on water quality due to their proximity, or influence to a 303 (d) listed stream segment. Unlike Tier 1 fields, **Tier 2** fields are not directly adjacent to a 303 (d) listed stream segment, and the wastewater from Tier 2 acreage has the potential to be reused by Tier 1 acreage before entering a 303 (d) listed stream segment.

Tier 3 fields are located in the uplands where wastewater has the potential to be used multiple times by Tier 2 and Tier 1 acreage before entering a stream segment of concern.

Figure 3, Lower Succor Creek Tier Map shows the agricultural fields that fall into each category.

In terms of BMP implementation Tier 1 Fields are high priority, Tier 2 Fields are medium priority, and Tier 3 Fields are low priority in terms of water quality.

Lower Succor Creek

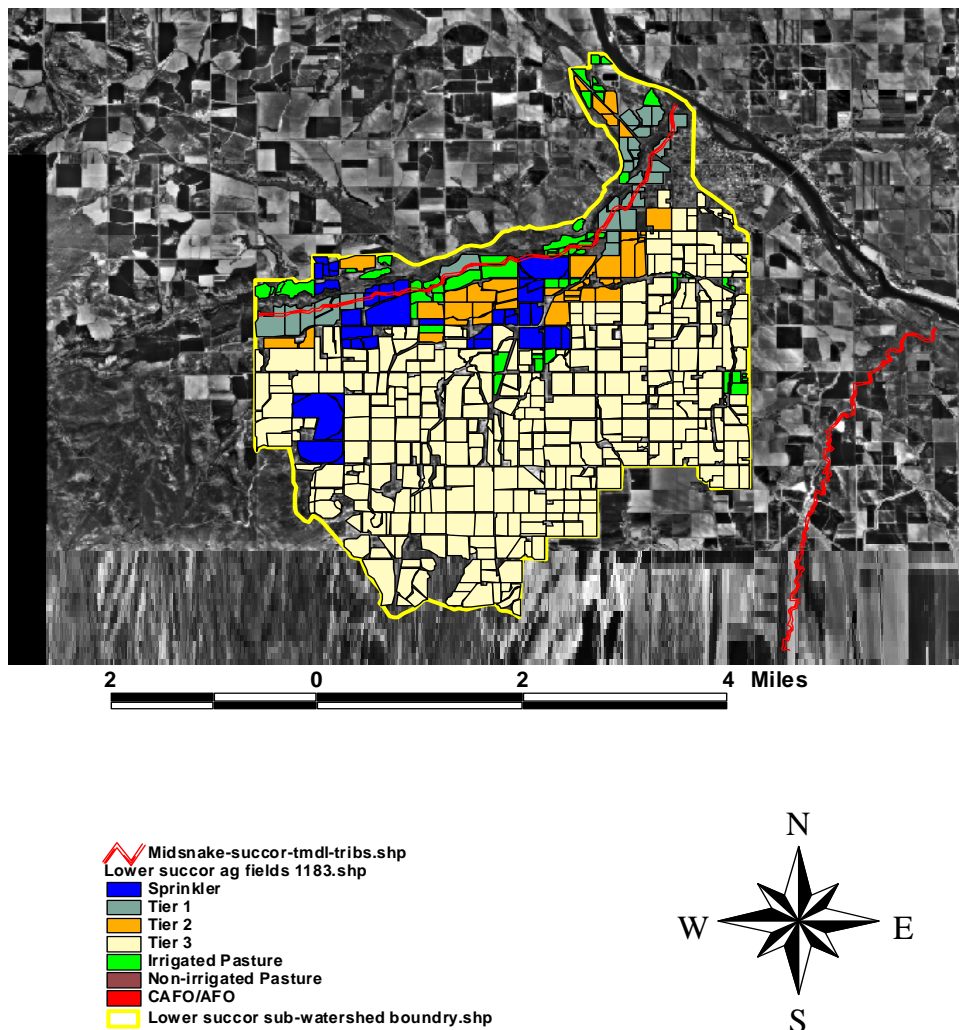


Figure 3. Lower Succor Creek Tier Map

Tiers 1-3 only apply to surface irrigated cropland fields and do not include sprinkler irrigated agricultural land, pastureland, or CAFO/AFO units within The Lower Succor Creek Sub-watershed.

The Lower Succor Creek Sub-watershed consists of a total of 10,505.1 acres, but only 7,891.6 acres (75.1%) actually produces agricultural crops. Table 6 below shows the total farmable acres in each of their respective categories.

Table 5. Lower Succor Creek Sub-watersheds

Treatment Unit	Acres	Percentage of total ag. Acres
Tier 1: surface irrigated cropland	438.8	5.6%
Tier 2: surface irrigated cropland	565.3	7.2%
Tier 3: surface irrigated cropland	5822.3	73.8%
Irrigated Pasture	406.7	5.1%
Sprinkler irrigated cropland	658.5	8.3%
CAFO/AFO	N/A	0.0%
Total	7891.6	100%

Implementation Plan BMPs

Agricultural conservation and soil erosion practices are typically referred to as Best Management Practices (BMPs). These practices are nationally derived systems to control, reduce, or prevent soil erosion and sedimentation on agricultural land uses (APAP, 2003). BMPs are selected to reduce irrigation-induced and streambank erosion, contain and filter sediment, nutrients, and bacteria from irrigation wastewater, contain and properly dispose of animal wastes, and reduce leaching of nutrients and pesticides. Proper implementation of BMPs on agricultural fields within the Lower Succor Creek Sub-watershed will improve the quality of surface water in the project area and reduce pollutant loading to the Snake River from Lower Succor Creek.

BMP Implementation Costs

The cost list to install BMPs on private agricultural land is available from the Owyhee Soil Conservation District office in Marsing and the Bruneau River Soil Conservation District office in Bruneau. These costs have been developed through actual tracking of average BMP installation costs and are used county-wide to determine allowed contracted costs through the USDA Environmental Quality Incentives Program (EQIP). When there is a large distance between material suppliers and the location of installation, there is a greater overall cost for the BMP as a result of the cost for delivery. Where shallow soils exist, fence building materials (as well as installation costs) may differ greatly from typical costs. Since actual costs to install a BMP may not be known until during (or after) installation, a more accurate watershed-wide budget will be developed during the on-site planning and implementation process. Table 6 provides the typical costs for many of the applicable BMP components for southern Idaho. Labor and equipment costs are not included in this table due to the variation from one site to another.

Table 6. Average Costs of Component Practices Applicable to Owyhee County

Component Practice	Unit of Measure	Cost/Unit
Anionic Polyacrylamide (PAM)	Acre	\$ 12.50
Cover Crop	Acre	\$ 30.00
Deep Tillage	Acre	\$ 12.00
Fence, 4 wire	Feet	\$ 1.40
Filter Strip	Acre	\$ 200.00
Irrigation (surge irrigation)	Acre	\$ 750.00
Irrigation (pivot)	Acre	\$1320.00
Irrigation (wheel line system)	Acre	\$1125.00
Prescribed Grazing, Irrigated Pasture	Acre	\$ 1.10
Prescribed Grazing, Rangeland	Acre	\$ 0.11
Pest Management (Noxious Weeds)	Acre	\$ 40.00
Nutrient Management	Acre	\$ 0.00
Spring Development	Each	\$2,000.00
Trough or Tank	Each	\$ 990.00
Streambank & Shoreline Protection	Each	Job Estimate
Stream Channel Stabilization	Each	Job Estimate
Wildlife Watering Facility	Each	\$ 500.00
Watering Facility, Nose pump	Each	\$ 550.00

Costs may increase with greater travel distances and accessibility

****Source: NRCS 2005 EQIP Cost List – Average Costs, For Estimates Only**

Example Description of Alternatives for Surface Irrigated Cropland (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

SITE SPECIFIC BMP Alternative #1a (\$1520/acre)	SITE SPECIFIC BMP Alternative #2 (\$575/acre)	SITE SPECIFIC BMP Alternative #3 (\$300/acre)
Irrigation Water Mgmt. Drip Irrigation System Nutrient Mgmt.Surface Conservation Crop Rotation	Irrigation Water Mgmt. Land Leveling Irrigated System Gated Pipe Tail Water Recovery System Nutrient Mgmt. Conservation Crop Rotation Conservation Tillage	Irrigation Water Mgmt. Concrete Ditch Filter Strip PAM Sediment Basin Nutrient Mgmt. Conservation Crop Rotation Conservation Tillage
Alternative #1b (\$920/acre) Sprinkler Irrigation Nutrient Mgmt. Conservation Crop Rotation Irrigation Water Mgmt.		

Example Description of Alternatives for Surface Irrigated Pasture (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

SITE SPECIFIC BMP Alternative #1 (\$520/acre)	SITE SPECIFIC BMP Alternative #2 (\$400/acre)	SITE SPECIFIC BMP Alternative #3 (\$290/acre)
Fencing Planned Grazing System Pasture & Hayland Mgmt. Nutrient Mgmt. Heavy Use Protection Livestock Watering Fac. Irrigation Water Mgmt Field Border Irr. System Gated Pipe	Fencing Planned Grazing System Pasture & Hayland Mgmt. Nutrient Mgmt. Irrigation Water Mgmt. Livestock Watering Fac. Field Border Irr. System	Fencing Pasture & Hayland Mgmt. Nutrient Mgmt. Livestock Watering Fac. Irrigation Water Mgmt. Field Border Irr. System

Table 7. Estimated BMP Cost Summary of Treatment Alternatives for Lower Succor Creek Sub-Watershed, Tier 1 Fields.

ALTERNATIVE	ACRES	Total Costs
Alternative 1a \$1520 / AC	439	\$ 667,280
Alternative 1b \$ 920 / AC	439	\$ 403,880
Alternative 2 \$ 575 / AC	439	\$ 252,425
Alternative 3 \$ 300 / AC	439	\$ 131,700

Table 8. Estimated BMP Cost Summary of Treatment Alternatives for Lower Succor Creek Sub-Watershed, Tier 1 & Tier 2 Fields.

ALTERNATIVE		ACRES	Total Costs
Alternative 1a	\$1520 / AC	1004	\$ 1,526,080
Alternative 1b	\$ 920 / AC	1004	\$ 923,680
Alternative 2	\$ 575 / AC	1004	\$ 557,300
Alternative 3	\$ 300 / AC	1004	\$ 301,200

Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.

Tasks for Privately Owned Parcels

Task 1: Develop conservation plans with private agricultural landowners.
Responsible

Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)

Timeline: Ongoing

Task 2: Assist private agricultural landowners to implement conservation plan components.

Responsible

Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)

Timeline: Ongoing

Task 3: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.

Responsible

Agencies: IASCD & ISCC (support from NRCS, IDL and BLM)

Timetable: Ongoing

APPENDIX #5

Funding Sources

Funding of Best Management Practices - *Search for Many Funding Sources Using Boise State University Environmental Finance Center.*
<http://ssrc.boisestate.edu>

Costs estimates relative to each of the designated agency responsibilities need to be estimated as individual water quality plans for private agricultural lands, grazing management plans for state lands, or water quality restoration plans for federal land. As always, funding issues and the availability of funding to implement best management practices is of concern. Much of the available funds that can be used to implement this plan are available annually on a first-come first-serve basis or through a competitive review and ranking process. The Boise State University Environmental Finance Center is a valuable resource for anyone interested in obtaining funding for projects. Chapter Four of the Idaho Nonpoint Source Management Plan (IDEQ, 1999a) also contains a fairly substantial listing of potentially available funding sources and cooperating agencies for use in the implementation of best management practices and includes several of the programs which could possibly be used as potential implementation funding sources:

§104(b)(3)... Tribal and State Wetland Protection Grant, EPA
<http://yosemite.epa.gov/R10/HOMEPAGE.NSF/webpage/Grants>

This program provides financial assistance to state, tribal, and local government agencies to develop new wetland protection programs or refine and improve existing programs. All projects must clearly demonstrate a direct link to improving an applicant's ability to protect, restore or manage its wetland resources.

§319 (h)... Nonpoint Source Grants, EPA/IDEQ
http://www.deq.state.id.us/water/water1.htm#ww_nonpoint

This program provides financial assistance for the implementation of best management practices to abate nonpoint source pollution. The IDEQ manages the NPS program. All projects must demonstrate the applicant's ability to abate NPS pollution through the implementation of BMPs.

Aquatic Ecosystem Restoration, CoE
<http://www.nab.usace.army.mil/whatwedo/civwks/CAP/206.pdf>

Section 206 of the Water Resources Development Act of 1996, provides financial assistance for aquatic and associated riparian and wetland ecosystem restoration and protection projects that will improve the quality of the environment. There is no requirement for an aquatic ecosystem project to be linked to a Corp of Engineers project. The program does require that a non-federal interest provide 35% of construction costs, including all lands, easements, right-of-ways and necessary relocations. The program also requires that 100% of the operation, maintenance, replacement, and rehabilitation be

borne by the non-federal interest. The program limits the amount of federal assistance to \$5 million for any single project.

Challenge Cost-share Program, BLM

<http://www.dfw.state.or.us/ODFWhtml/VolunteerProg/STEP.html>

This program provides 50% cost-share monies on fish, wildlife, and riparian enhancement projects to non-federal entities.

Conservation Operations Program (CO-01), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

The CO-01 program provides technical assistance to individuals and groups of landowners for the purpose of establishing a link between water quality and the implementation of conservation practices. The NRCS technical assistance provides farmers and ranchers with information and detailed plans necessary to conserve their natural resources and improve water quality.

Conservation Research and Education, NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

The Conservation Research and Education program was created through the 1996 Farm Bill and is administered by the National Natural Resources Conservation Foundation. The purpose of the program is to fund research and educational activities related to conservation on private lands through public-private partnerships.

Conservation Reserve Program (CRP), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

The CRP program provides a financial incentive to landowners for the protection of highly erodible and environmentally sensitive lands with grass, trees, and other long-term cover. This program is designed to remove those lands from agricultural tillage and return them to a more stable cover. This program holds promise for nonpoint source control since its aim is highly erodible lands.

Conservation Technical Assistance (CTA), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

Technical assistance for the application of BMPs is provided to cooperators of soil conservation districts by the NRCS. Preparation and application of conservation plans is the main form of technical assistance. Assistance can include the interpretation of soil, plant, water, and other physical conditions needed to determine the proper BMPs. The CTA program also provides financial assistance in implementing BMPs described in the conservation plan.

Environmental Quality Incentives Program (EQIP), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

EQIP is a program based on the 1996 Farm Bill legislation and combines the functions of the Agricultural Conservation Program, Water Quality Incentives Programs, Great Plains Conservation Program, and the Colorado River Basin Salinity Control Program. EQIP offers technical assistance, and cost share monies to landowners for the establishment of a five to ten year conservation

agreement activities such as manure management, pest management, and erosion control. This program gives special consideration to contracts in those areas where agricultural improvements will help meet water quality objectives.

Environmental Restoration, CoE <http://www.usace.army.mil>

Section 1135 of the Water Resources Development Act of 1986 provides for modifying the structure, operation, or connected influences or impacts from a Corp of Engineer project to restore fish and wildlife habitat. The project must result in the implementation or change from existing conditions, and the project benefits must be associated primarily with restoring historic fish and wildlife resources. Though recreation cannot be the primary reason for the modification, an increase in recreation may be one measure of value in the improvement to fish and wildlife resources. The program requires a non-federal sponsor which can include public agencies, private interest groups, and large national nonprofit organizations such as Ducks Unlimited or the Nature Conservancy. Operation and maintenance associated with the project modifications are the responsibility of the non-federal sponsor. Planning studies, detailed design, and construction are cost shared at a 75% federal and 25% non-federal rate. No more than \$5 million in federal funds may be spent at a single location.

Farm Services Agency Direct Loan Program, FSA

<http://www.fsa.usda.gov/pas/default.asp>

This program provides loans to farmers and ranchers who are unable to obtain financing from commercial credit sources. Loans from this program can be used to purchase or improve pollution abatement structures.

Hydrologic Unit Areas (HUAs), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

The NRCS is responsible for the HUA water quality projects. The purpose of these projects is to accelerate technical and cost-share assistance to farmers and ranchers in addressing agricultural nonpoint source pollution.

Idaho Water Resources Board Financial Programs, IDWR

<http://www.idwr.state.id.us/waterboard/financial.htm>

The Idaho Water Resources Board Financial Program assists local governments, water and homeowner associations, non-profit water companies, and canal and irrigation companies with funding for water system infrastructure projects. The various types of projects that can be funded include: public drinking water systems, irrigation systems, drainage or flood control, ground water recharge, and water project engineering, planning and design. Funds are made available through loans, grants, bonds, and a revolving development account.

National Conservation Buffer Initiative, NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

The National Conservation Buffer Initiative program provides cost-share funds in an effort to use grasses and trees as conservation buffers to protect and enhance riparian resources on farms. This program will be an integral part of

TMDL/WRAS implementation planning to ensure land management practices are moved away from streams and riparian areas.

Planning Assistance, CoE <http://www.usace.army.mil>

Section 22 of the Water Resources Development Act of 1974 authorizes the Corp of Engineers to assist local governments and agencies, including Indian Tribes, in preparing comprehensive plans for the development, utilization and conservation of water and related resources. Total costs for projects cannot exceed \$1 million in a single year and are cost-shared at a 50% federal and 50% non-federal rate.

Range Improvement Fund - 8100, BLM <http://www.id.blm.gov>

This program focuses on improving rangeland management conditions, including the implementation of best management practices. A portion of the money to operate the program comes from the grazing fees paid by permittees.

Small Watersheds (PL-566), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

The Small Watersheds program authorizes the NRCS to cooperate in planning and implementing efforts to improve soil and water conservation. The program provides for technical and financial assistance for water quality improvement projects, upstream flood control projects, and water conservation projects.

Partners for Wildlife (Partners), USFWS <http://partners.fws.gov>

The Partners for Wildlife program is implemented by the U.S. Fish and Wildlife Service and designed to restore and enhance fish and wildlife habitat on private lands through public/private partnerships. Emphasis is on restoration of riparian areas, wetlands, and native plant communities.

Pheasants Forever <http://www.pheasantsforever.org>

Pheasants Forever can provide up to 100 percent cost-share for pheasant and other upland game projects which establish, maintain, or enhance wildlife habitat.

Resource Conservation and Development (RC&D), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

Through locally sponsored areas, the RC&D program assists communities with economic opportunities through the wise use and development of natural resources by providing technical and financial assistance. Program assistance is available to address problems including water management for conservation, utilization and quality, and water quality through the control of nonpoint source pollution.

Resource Conservation and Rangeland Development Program (RCRDP), SCC

<http://www.scc.state.id.us/loans.htm>

The RCRDP program provides grants for the improvement of rangeland and riparian areas, and loans for the development and implementation of conservation improvements.

State Revolving Fund (SRF), IDEQ

<http://www.deq.state.id.us/water/water1.htm#funding>

The IDEQ Grant and Loan Program administers the State Revolving Fund. <http://www.deq.state.id.us/water/water1.htm#funding> The purpose of the program is to provide a perpetually revolving source of low interest loans to municipalities for design and construction of sewage collection and treatment facilities to correct public health hazards or abate pollution. State Revolving Loan funds are also used to support the Source Water Assessment Program and Nonpoint Sources.... The Grant and Loan Program uses a priority rating form to rank all projects primarily on the basis of public health, compliance, and affordability. Additional points are awarded to projects that have completed a source water assessment and are maintaining a protection area around their source.

Stewardship Incentives Program (SIP), IDL

<http://www2.state.id.us/lands/Forest%20Legacy/Assessment%20of%20Need%20Breakout%20Files/8-Existing%20Conservation%20Efforts.pdf>

SIP provides technical and financial assistance to encourage non-industrial private landowners to keep their lands and natural resources productive and healthy. Qualifying land includes rural lands with existing tree cover or land suitable for growing trees. Eligible landowners must have an approved Forest Stewardship Plan and own less than 1,000 acres.

Water Quality Program for Agriculture (WQPA), ISCC

<http://www.scc.state.id.us/docs/wqpafs.doc>

Provides financial incentives to owners and operators of agricultural lands to apply conservation practices to protect and enhance water quality and fish and wildlife habitat.

Wetlands Reserve Program (WRP), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

WRP was established to help landowners work toward the goal of "no net loss" of wetlands. This program provides landowners the opportunity to establish 30-year or permanent conservation easements, and cost-share agreements for landowners willing to provide wetlands restoration.

Wildlife Habitat Incentive Program (WHIP), NRCS

<http://www.id.nrcs.usda.gov/programs/financial.html>

WHIP was established to help landowners improve habitat on private lands by providing cost-share monies for upland wildlife, wetland wildlife, endangered species, fisheries, and other wildlife. Additionally, cost share agreements developed under WHIP require a minimum 10-year contract.

LITERATURE CITED

Cowley, E.R. 1992. Protocols for classifying, monitoring, and evaluating stream/riparian vegetation on Idaho rangeland streams. Idaho Department of Health and Welfare, IDEQ. Water Quality Monitoring Protocols Report No. 8. 37 pp.

IDEQ. 2004. Middle Snake River/Succor Creek SBA-TMDL.

ISCC and IDEQ 2003. Idaho Agricultural Pollution Abatement Plan. March 2003.

USDI Bureau of Land Management. 1997. Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management. USDI Bureau of Land Management, Idaho State Office, Boise, Idaho.

USDI Bureau of Land Management. 1999a. Environmental Assessment: Battle Creek Allotment Grazing Management. EA No. 99045. USDI Bureau of Land Management, Lower Snake River District, Bruneau Field Office, Boise, ID.

USDI Bureau of Land Management. 1999b. Owyhee Resource Management Plan. USDI Bureau of Land Management, Lower Snake River District, Owyhee Field Office, Boise, Idaho.

USDI Bureau of Land Management. 2000. Environmental Assessment: Northwest Allotment grazing permit issuance and modifications and associated range projects. EA No. ID-096-01-015. USDI Bureau of Land Management, Lower Snake River District, Owyhee Field Office, Boise, ID.

USDI Bureau of Land Management. 2003. Environmental Assessment: Grazing Permit Renewal for Boone Peak Allotment. EA No. ID-096-2003-066. USDI Bureau of Land Management, Lower Snake River District, Owyhee Field Office, Boise, ID.

USDI Bureau of Land Management. 2004. Environmental Assessment: Grazing Permit Renewal for Silver City Allotment. EA No. ID-096-2004-006. USDI Bureau of Land Management, Lower Snake River District, Owyhee Field Office, Boise, ID.

Middle Snake River / Succor Creek Implementation Plan for Public Lands



Goals and Objectives for Federal Lands

To comply with the Clean Water Act and protect and enhance the quality of the surface and ground water in the Middle Snake River/Succor Creek Subbasin, BLM is responsible for developing range management plans that authorize livestock grazing on Federal lands, while meeting State Water Quality Standards criteria in the subbasin.

Federal grazing regulations require that the BLM determine if grazing related management practices are achieving Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing (USDI 1997) or are making significant progress toward their achievement, and conform with the Guidelines for Livestock Grazing Management (Code of Federal Regulations, Section 4180). Standards for Rangeland Health for Idaho include a standard for Water Quality (Standard 7), which states surface and ground water on public lands comply with the State of Idaho Water Quality Standards and Wastewater Treatment Requirements. BLM policy states that assessments for standards of rangeland health (Assessments) will be completed for all grazing allotments on Federal lands during the next 4 years.

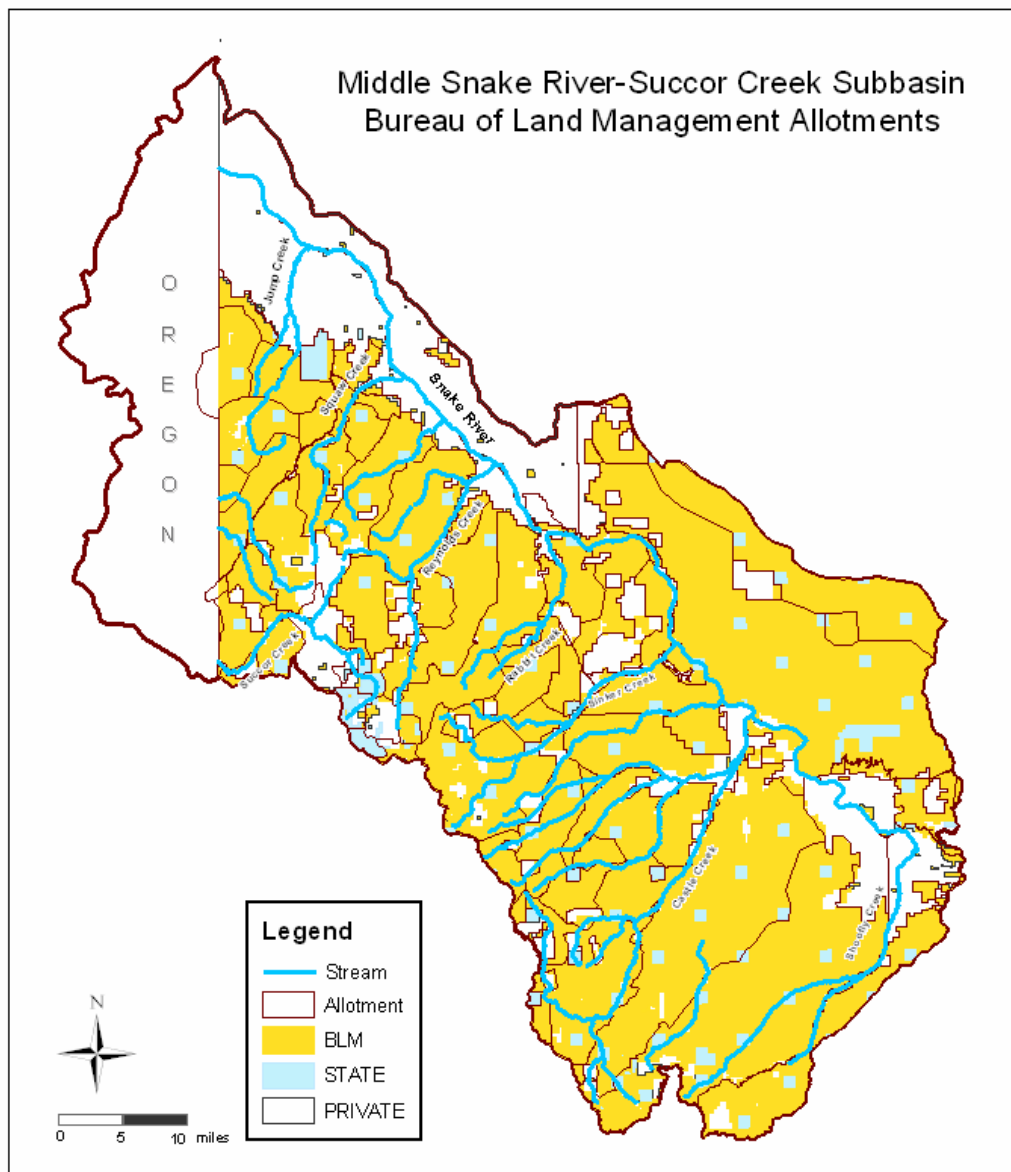


Figure 1. Locations of grazing allotments in the Middle Snake River/Succor Creek Subbasin where the BLM authorizes livestock grazing. Reference Table 1 for allotment names and numbers.

BLM authorizes livestock grazing on federal lands encompassing 76 grazing allotments that comprise nearly 70% of the Middle Snake River/Succor Creek Subbasin. Federal lands within 42 grazing allotments that contain 303(d) listed streams include 53% of the land within the subbasin (Figure 1). BLM authorized livestock grazing of federal lands may potentially be impacting these water-quality impaired stream segments, especially those allotments that are not meeting BLM standards and guidelines.

Assessments for Standards of Rangeland Health are scheduled to be completed by 2009 for all Federal-grazing allotments within the Middle Snake River/Succor Creek Subbasin.

The Assessments will include evaluations of current water quality conditions and compliance with State of Idaho water quality criteria. Grazing on BLM allotments will be revised based on the findings of the Rangeland Health Assessments. Environmental Assessments (EAs) are then prepared that analyze alternatives to modifying the grazing permits. These EAs will include Water Quality Restoration Plans (WQRP) that outline Best Management Practices used to address nonpoint source pollution. The WQRPs also specify monitoring that will be conducted to evaluate the effectiveness of prescribed BMPs in improving water quality. Any changes to range management on allotments in the subbasin (ie. implementation of BMPs) will be formalized through the issuance of proposed and final decisions that modify the existing permits authorizing livestock grazing on Federal lands.

BMPs and/or component practices that typically have been applied to address impacts to water quality resulting from BLM authorized livestock grazing include, but are not limited to:

- Development of offsite water;
- Limiting of livestock utilization of streamside and floodplain vegetation;
- Fencing to modify or exclude livestock use of riparian and aquatic habitats;
- Development of detailed range management plans that change seasons of use, or
- Prescribed rest or deferment for pastures that contain riparian/aquatic habitat, where necessary to meet in-stream, riparian and floodplain objectives (ISCC and IDEQ 2003).

In general, emphasis is placed on range management plans that modify grazing practices to conform to Guidelines for Livestock Grazing Management, while not requiring large expenditures on projects such as fencing, and/or water developments. The extensive amount of stream mileage and rugged terrain where these allotments are located may make certain projects cost prohibitive.

Table 1. Grazing allotments with 303(d) streams in the Middle Snake River/Succor Creek Subbasin where BLM authorizes livestock grazing and scheduled date for completion of Assessment for Standards of Rangeland Health.

Allotment Number	Allotment Name	Federal Land Acreage ¹	303(d) Stream	Year Assessed or Scheduled for Assessment
00514	Alkali-Wildcat	6380	Jump Creek	2005
00607	Baltzor FFR	367	Succor Creek	2004
00515	Blackstock Springs	12794	McBride Creek ²	2005
00589	Boone Peak	18349	North Fork Castle Creek, Pickett Creek ²	2003

Allotment Number	Allotment Name	Federal Land Acreage¹	303(d) Stream	Year Assessed or Scheduled for Assessment
00534	Box T	4393	North Fork Castle Creek	2005
00590	Bridge Creek	1063	North Fork Castle Creek	2004
00585	Browns Creek	3865	Browns Creek ²	2005
00638	Burgess FFR	78	Succor Creek	2005
00476	Bush Ranch FFR	275	McBride Creek ²	2005
00801	Castle Creek	82142	South Fork Castle Creek, Birch Creek	1999
00523	Chipmunk Field FFR	544	Succor Creek	2005
00571	Con Shea	12548	Sinker Creek	2004
00893	East Castle Creek	87991	South Fork Castle, Birch* Creeks	2007
00513	Elephant Butte	8252	Squaw Creek ²	2003
00619	Evans FFR	726	Succor Creek	2004
00535	Fossil Butte	20355	Sinker Creek	2005
00516	Hardtrigger	21593	Hardtrigger Creek ²	2003
00624	Jaca FFR	631	Succor Creek	2003
00506	Jackson Creek	1191	Succor Creek	2005
00487	Joyce FFR	5643	Sinker Creek	2004
00601	Louisa Creek	2109	North Fork Castle Creek	2005
00654	Montini FFR	2220	Sinker Creek	2005
00603	Poison Creek	3172	Jump Creek	2004
00806	Pole Creek Individual	3029	Castle Creek	2009
00522	Rats Nest	4891	Squaw Creek ²	2004
00588	Red Mountain	14484	Browns Creek ² , Pickett Creek ²	2004
00508	Reynolds Creek	44336	Hardtrigger Creek ²	2004

Allotment Number	Allotment Name	Federal Land Acreage¹	303(d) Stream	Year Assessed or Scheduled for Assessment
00565	Rockville	13218	McBride Creek ²	2004
00521	Sands Basin	10862	Jump Creek	2004
00556	Shares Basin	11103	Squaw Creek ²	2004
00569	Silver City	40017	Sinker Creek	2003
00578	Sinker Butte	7079	Sinker Creek	2005
00511	Succor Creek	11431	Succor Creek	2004
00616	Tyson FFR	423	Succor Creek	2004
00604	Walker FFR	238	Squaw Creek ²	2004
00648	West Castle	9823	Browns Creek ²	2007
00541	Whitehorse/Antelope	36608	North Fork Castle, South Fork Castle, Browns ² Creeks	2005

¹Portion of the allotment located within the Middle Snake River/Succor Creek Subbasin.

² = These intermittent streams were de-listed in the TMDL. Some of these streams contain perennial reaches. BLM considers all of these streams to contain important riparian resources and will manage these streams to achieve proper functioning condition.

Note: Allotments that include only the Snake River are not included in this table because livestock grazing has not been identified as a pollutant source affecting this reach of the river.

Recent examples of grazing management plans written by BLM to address water quality concerns in the upper Middle Snake River/Succor Creek Subbasin include the issuance of the Boone Peak Allotment Grazing Permit (Environmental Assessment [EA] No. ID-096-2003-066) and the Silver City Allotment Grazing Permit (EA No. ID-096-2004-006). Both of these Environmental Assessments include Water Quality Restoration Plans (USDI 2003, 2004) for addressing non-point source pollution impacts resulting from BLM authorized livestock grazing.

As part of grazing allotment assessments, BLM also inventories riparian areas, streams and watersheds for activities other than livestock grazing that may be impacting water quality such as poorly located or constructed roads, and unauthorized off-road vehicle use. These impacts are minimally identified in the assessment, and BLM implements restoration actions to address these impacts where possible. For example, BLM implemented several stream channel restoration projects in the upper Battle Creek watershed that were identified as needed during the Battle Creek Allotment grazing Assessment (USDI 1999a). Some of the impacts from off-road vehicle use are difficult to address with current funding and staffing levels, but BLM anticipates additional resources will become available as part of Access Management Plans that are being

developed as part of the implementation of the Owyhee Resource Area Management Plan (USDI 1999b) and of the Bruneau Resource Area Management Plan (currently in preparation).

Funding Opportunities

Monitoring and restoration actions taken to improve water quality on federal lands managed by BLM are conducted with funding appropriated by congress to the BLM to manage public lands in accordance with the Federal Land Policy and Management Act of 1976. BLM can apply for additional funding such as that from Clean Water Grants. However, opportunities to obtain additional funding in the form of grants for the restoration or improvement of water quality on federal lands are limited because BLM must have a non-federal partner to qualify for the grants.

Monitoring Plan

Water Quality Restoration Plans prepared as part of the issuance of each grazing permit include monitoring plans for evaluating the success of management actions in improving water quality of listed §303(d) streams. As part of the best management practices feedback-loop process, stream temperatures will be monitored at 5-year intervals, or as deemed necessary, to evaluate changes in water temperature with improved stream shading and channel morphology.

The BLM will also conduct greenline plant community composition studies to evaluate the change in the plant community composition along the greenline of the stream. The greenline is the first continuous band of perennial vegetation located up from the stable low water level of the stream (Cowley 1992). Greenline plant community composition and cover will be monitored every 5 years to evaluate the trend in streamside vegetation. Trend photographs will also be taken periodically at greenline monitoring sites. Bacteria levels (*E. coli* concentrations) will be monitored periodically to evaluate changes in bacteria levels with improved streambank and channel conditions (resulting in reduced sediment and bacteria inputs).

Those interested in examining monitoring data collected on streams listed in BLM Water Quality Restoration Plans can contact the BLM Owyhee Field Office to review or obtain copies of the monitoring information (<http://www.id.blm.gov/offices/owhyee/index.htm>). Increases in the density and cover of riparian vegetation on streambanks are the first indicators that revised grazing practices are resulting in progress towards water quality goals. An example of this are photos of Big Jacks Creek (Figures 2a and 2b) taken July 25, 1996 and August 26, 2003 that show increased riparian shrub cover as the result of grazing practices implemented as part of the Northwest Allotment grazing decision and associated WQRP (USDI 2000). Season of grazing use was changed from summer-long use to spring grazing on this segment of Big Jacks Creek to improve quality of water delivered to Jacks Creek, which is a 303(d) listed stream. These photos also show the potential of many perennial streams in the Middle Snake River/Succor Creek Subbasin to support dense willow-dominated riparian plant communities and meet objectives for stream shade identified in the Middle Snake River/Succor Creek TMDL (DEQ 2004).



Figure 2. Increase in riparian shrub cover and stream shade from 1996 (a) to 2003 (b) on Big Jacks Creek in the Northwest Allotment. Livestock grazing was changed from summer grazing to spring (June) grazing in 1997. Note the distinctive rock cliff notch (A), lichen-covered cliff wall (B), and cliff breaks (C) in the background of the photographs (the angle of the photos differ slightly because shrub growth on the right side of the stream completely obscured the original view by 2003).

If it is found through monitoring that water quality standards cannot be or are not met on certain stream segments, then site-specific water quality standards may need to be developed as set forth in the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02.275.01).

Federal Land Management - Tasks

Task 1: Complete Allotment Assessments for grazing allotments located in the Middle Snake River/Succor Creek Subbasin on or before the schedule developed to comply with the BLM policy and regulations (see Table 15).

Milestones: 1999-2001 – completed 1 Assessment
 2002-2004 – completed 20 Assessments
 December 2005 – complete 13 additional Assessments
 December 2007 – complete 2 additional Assessments
 December 2009 – complete remaining 1 Assessment

Responsible Agency: U.S.D.I. Bureau of Land Management

Task 2: Prepare Water Quality Restoration Plans for §303(d) listed streams on all grazing allotments within the Middle Snake River/Succor Creek Subbasin

Milestones: Same type date and targets as above

Responsible Agency: U.S.D.I. Bureau of Land Management

- Task 3. Issue new grazing permits that include Best Management Practices (BMPs) identified to improve/restore water quality of streams within grazing allotments where BLM authorizes livestock grazing on public lands
Milestones: Same as above
Responsible Agency: U.S.D.I. Bureau of Land Management
- Task 4. Monitor livestock use levels of riparian herbaceous vegetation and woody shrubs on §303(d) listed streams on public lands where BLM authorizes livestock grazing
Milestones: Annually to biannually, generally at the end of the grazing or growing season
Responsible Agency: U.S.D.I. Bureau of Land Management
- Task 5. Monitor effectiveness of Best Management Practices (BMPs) implemented to improve/restore water quality of §303(d) listed streams on public lands managed by BLM.
Milestones: Every 5 years following the issuance of new grazing permits that include BMPs examine trend in streamside plant community composition, and plant density and vigor
Responsible Agency: U.S.D.I. Bureau of Land Management
- Task 6. Evaluate compliance with State of Idaho Water Quality Criteria in streams on public lands where BLM authorizes livestock grazing
Milestones: Minimally, every 5 years, or more often as deemed necessary
Responsible Agency: U.S.D.I. Bureau of Land Management, Idaho Department of Environmental Quality

Figure Legends:

Figure 1. Locations of grazing allotments in the Middle Snake River/Succor Creek Subbasin where the U.S. Bureau of Land Management authorizes livestock grazing. Reference Table 1 for allotment names and numbers.

Figure 2. Increase in riparian shrub cover and stream shade from 1996 (a) (photo dated 7.25.96) to 2003 (b) (photo dated 8.26.03) on Big Jacks Creek in the Northwest Allotment. Livestock grazing was changed from summer grazing to spring (June) grazing in 1997. Note the distinctive rock cliff notch (A), lichen-covered cliff wall (B), and cliff breaks (C) in the background of the photographs (the angle of the photos differ slightly because shrub growth on the right side of the stream completely obscured the original view by 2003).

GOALS AND OBJECTIVES FOR STATE ENDOWMENT LANDS

To protect and enhance both the quality of the surface and ground water in the Mid Snake Succor Creek watersheds by developing detailed grazing management plans to meet State Water Quality Standards. State Endowment Lands are administered to maximize revenues overtime to the State Endowment Fund. This is done through consistent sound long term management practices to maintain or improve the resource. The Idaho Department of Lands (IDL) is responsible for developing detailed grazing management plans that address water quality issues on State Endowment Lands which will provide for the protection and restoration of beneficial uses and meet State Water Quality Standards.

State Land Tasks

Task 1:	Prepare or revise grazing management plans on State Allotments so that water quality standards will be met within a reasonable length of time.
Milestones:	Every 4-10 years when the lease comes up for renewal.
Responsible Agency:	Idaho Department of Lands
Task 2:	Implement grazing management plans on State grazing allotments
Milestones:	Annually on blocks of State land.
Responsible Agency:	Idaho Department of Lands
Task 3:	Monitor and review of state grazing leases
Milestones:	Annually on blocks or when lease comes up for renewal.
Responsible Agency:	Idaho Department of Lands
Task 4:	Develop and implement short term and long term monitoring in State grazing allotments
Milestones:	Already in place, or looked at when the lease comes up for renewal.
Responsible Agency:	Idaho Department of Lands